

SECTION 4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This section presents the results of the analysis of direct, indirect, and cumulative environmental and socioeconomic impacts that would likely occur from implementing the No Build Alternative, Alternative B/O, Alternative J, Alternative P, and Alternative Q. In addition, this section identifies any adverse unavoidable environmental effects, the relationship between short-term environmental uses and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitment of resources involved with implementing the proposed action.

4.1.1 Direct versus Indirect Impacts

The terms *impact* and *effect* are synonymous as used in this EIS. Impacts could be beneficial or adverse and could apply to the full range of natural, aesthetic, historic, cultural, and economic resources of St. Tammany Parish. Definitions and examples of direct and indirect impacts as used in this document are as follows:

- **Direct Impact.** A direct impact would be caused by implementing one of the four alternatives and would occur at the same time and place. Direct impacts are those impacts that could happen during construction within or adjacent to the 250-ft ROW of a particular alignment.
- **Indirect Impact.** An indirect impact would be caused by operating one of the four alternatives and would occur later in time or farther removed in distance, but it would still be a reasonably foreseeable outcome of the action. Indirect impacts could include induced changes in the pattern of land use, population density or growth rate, and indirect impacts on air, water, and other natural resources and social systems. Indirect impacts are those impacts that could happen beyond the 250-ft ROW of a particular alignment and/or that could occur after project construction is complete.
- **Direct versus Indirect Impacts.** For direct effects to occur, a resource must be present. For example, if highly erodible soils were disturbed as a direct result of using heavy equipment during construction of an alternative, there could be a direct impact on soils due to erosion. This could later indirectly affect water quality if stormwater runoff containing sediment from the construction site enters adjacent waterbodies.

4.1.2 Short-term versus Long-term Impacts

Impacts are also expressed in terms of duration. Short-term impacts are described as lasting one year or less. For example, the construction of an alternative would likely expose soil in the immediate area of construction. However, this impact would be considered short-term because it would be expected that vegetation would be reestablished on the disturbed area within a year of the disturbance. Long-term impacts are described as lasting beyond one year and can potentially continue into perpetuity, in which case they would also be described as permanent.

4.1.3 Cumulative Impacts

Increasing evidence indicates that the most severe environmental consequences do not result from the direct impacts of any particular action but from the combination of impacts of multiple,

1 independent actions over time. As defined in 40 CFR 1508.7 (CEQ Regulations), a cumulative
 2 impact is the “impact on the environment which results from the incremental impact of the action
 3 when added to other past, present, and reasonably foreseeable future actions regardless of what
 4 agency (federal or nonfederal) or person undertakes such other actions.” Some authorities
 5 contend that most environmental impacts could be seen as cumulative because almost all systems
 6 have already been modified. Table 4-1 presents the principles of cumulative impacts analysis, as
 7 described in the CEQ guide *Considering Cumulative Impacts under the National Environmental*
 8 *Policy Act*.

9 **Table 4-1.**
 10 **Principles of cumulative impacts analysis**

Cumulative impacts are caused by the aggregate of past, present, and reasonably foreseeable future actions.

Cumulative impacts are the total impacts, including both direct and indirect impacts, on a given resource, ecosystem, and human community of all actions taken, no matter who (federal, nonfederal, or private) has taken the actions.

Cumulative impacts need to be analyzed in terms of the specific resource, ecosystem, and human community being affected.

It is not practical to analyze the cumulative impacts of an action on the universe; the list of environmental impacts must focus on those that are truly meaningful.

Cumulative impacts on a given resource, ecosystem, and human community are rarely aligned with political or administrative boundaries.

Cumulative impacts could result from the accumulation of similar impacts or the synergistic interaction of different impacts.

Cumulative impacts could last for many years beyond the life of the action that caused the impacts.

Each affected resource, ecosystem, and human community must be analyzed in terms of the capacity to accommodate additional impacts, based on its own time and space parameters.

11
 12 **4.1.4 Intensity of Impacts**

13 The following terms are used to describe the degree of direct and indirect impacts, whether they
 14 are adverse or beneficial:

- 15 • Negligible – the impact is at the lowest levels of detection.
- 16 • Minor – the impact is slight but detectable.
- 17 • Moderate – the impact is readily apparent.
- 18 • Major – the impact is severely adverse or exceptionally beneficial.

19 The descriptor *major* does not imply a significant impact (see below) unless specifically stated.

20 **4.1.5 Significance**

21 In accordance with CEQ regulations and implementing guidance, impacts are also evaluated in
 22 terms of being significant. The term *significant*, as defined in 40 CFR 1508.27, part of the CEQ
 23 regulations for implementing NEPA, requires considerations of both context and intensity.
 24 *Context* means that the significance of an action must be analyzed in several settings, such as
 25 society as a whole, the affected region, the affected interests, and the locality. Significance varies
 26 with the setting of the proposed action. For instance, in the case of a site-specific action,

1 significance would usually depend on the impacts on the locale rather than on the world as a
2 whole. Both short- and long-term impacts are relevant to the consideration of the significance of
3 an impact.

4 *Intensity* refers to the severity of impact and includes the ratings described in Section 4.1.4 (i.e.,
5 negligible through major). Factors contributing to the evaluation of the intensity of an impact
6 include, but are not limited to, the following:

- 7 • The balance of beneficial and adverse impacts in a situation where an activity has
8 both.
- 9 • The degree to which the action affects public health or safety
- 10 • The unique characteristics of the geographic area where the action is proposed, such
11 as proximity to parklands, historic or cultural resources, wetlands, prime farmlands,
12 wild and scenic rivers, and ecologically critical areas.
- 13 • The degree to which the impacts on the quality of the human environment are likely
14 to be controversial
- 15 • The degree to which the impacts of the action on the quality of the human
16 environment are likely to be highly uncertain or involve unique or unknown risks
- 17 • The degree to which the action might establish a precedent for future actions with
18 significant impacts or represents a decision in principle about a future consideration
- 19 • Whether the action is related to other actions with individually insignificant but
20 cumulatively significant impacts. Significance exists if it is reasonable to anticipate a
21 cumulatively significant impact on the environment. Significance cannot be avoided
22 by terming an action temporary or by breaking it down into small component parts
- 23 • The degree to which the action might adversely affect districts, sites, highways,
24 structures, or objects listed in or eligible for listing in the NRHP or might cause loss
25 or destruction of significant scientific, cultural, or historical resources
- 26 • The degree to which the action might adversely affect an endangered or threatened
27 species or habitat that has been determined to be critical under the Endangered
28 Species Act of 1973
- 29 • Whether the action threatens a violation of federal, state, or local law or requirements
30 imposed for the protection of the environment

31 **4.1.6 Rationale for Alternative Analysis**

32 The USACE has identified the No Build Alternative, Alternative B/O, Alternative J, Alternative
33 P, and Alternative Q as the principal alternatives for detailed analysis. The underlying rationale
34 for each of the alternatives developed for analysis is provided in Sections 2.1 and 2.2.

35 **4.2 LAND USE**

36 **4.2.1 No Build Alternative**

37 Under the No Build Alternative, construction of the proposed roadway from I-12 to Bush would
38 not be undertaken. Consequently, there would be no direct or indirect impacts to land use within
39 the ROW, or vicinity of, any of the alternative alignment's corridors.

4.2.2 Build Alternatives

Direct and indirect impacts to land use would be expected to be similar for each of the Build Alternatives as described below. Differences in land use impacts between alternatives are described in Sections 4.2.2.1 through 4.2.2.4.

Direct Impacts to Land Use

Long-term significant adverse impacts to existing land use would be expected to occur under each of the Build Alternatives. Existing land use would be converted to impervious road surfaces and a simplified habitat of grasses and herbaceous material in the 250-ft ROW.

Conflicts with existing state, parish, or local land use plans, policies, or controls would be anticipated. Areas zoned as suburban, estate, industrial, and single-family residential could be converted and existing homes and commercial buildings could be acquired and converted to roadway.

Indirect Impacts to Land Use

Long-term significant adverse indirect impacts could occur under the Build Alternatives. Highway development could indirectly induce secondary development along the alignment or at intersections with other roadways. New developments including residential and commercial areas, lodging, and convenience stores could occur as a result of construction of the roadway.

In St. Tammany Parish secondary development is limited to some extent through zoning. A parish-wide zoning plan has been developed to concentrate industrial, commercial, and business growth along existing major roads near I-12 and limit majority of the project area to suburban development (see Figure 3-3). The ND 2025 plan identifies the best locations for business parks and regional retail facilities to be in the vicinity of intersections of local roadways with I-12. Construction of the I-12 to Bush roadway could be expected to service these locations leading to additional development and changes in land use from open space to developed. As development and population in the parish increase, additional changes in land use could be expected from open space and natural settings to developed areas.

4.2.2.1 Alternative B/O

Direct Impacts to Land Use

Long-term significant adverse direct impacts to land use would be expected to occur under Alternative B/O. Approximately 6.0 miles of the proposed 19.5-mile alignment would be built and expanded over existing roadway and 12.5 miles would be a new roadway alignment. Under Alternative B/O, approximately 138 acres of existing land use would be converted to highway and associated ditches in the 250-ft ROW. Table 4-2 lists the land use types directly impacted in the 250-ft ROW for Alternative B/O.

Table 4-2.
Alternative B/O land use converted to highway

<i>Land Use</i>	<i>Area (acres)</i>
Developed, Low Intensity	20.84
Developed, Medium Intensity	3.60
Developed, High Intensity	0.22
Developed, Open Space	113.19

Source: U.S. Department of Interior 2007

Existing development in the proposed ROW would be relocated or removed. An estimated 14 owner-occupant families and five businesses, including three service stations, one Dollar General store, and one insurance company would be displaced.

Indirect Impacts to Land Use

No additional indirect impacts would be expected beyond those listed in Section 4.2.2.

4.2.2.2 Alternative J

Direct Impacts to Land Use

Long-term significant adverse direct impacts to land use would be expected to occur under Alternative J. Alternative J is a 21.1 mile alignment with 14.2 miles on an existing abandoned railroad corridor, 1.5 miles on existing roadway, and 5.4 miles on new alignment. Under Alternative J, approximately 52 acres of existing land use would be converted to highway and associated ditches in the 250-ft ROW. Table 4-3 lists the land use permanently lost and converted to roadway under this alternative.

**Table 4-3.
Alternative J land use/land cover converted to highway**

<i>Land Use</i>	<i>Area (acres)</i>
Developed, Low Intensity	5.53
Developed, Medium Intensity	4.99
Developed, Open Space	41.61

Source: U.S. Department of Interior 2007

Existing development in the proposed ROW would be relocated or removed. Construction of Alternative J would displace an estimated 51 families. Of these families, 26 are owner-occupants and 25 are apartment tenants. Fifteen families occupy mobile homes which are considered movable, but owner occupied. Approximately 14 businesses would also be displaced (C.H. Fenstermaker 2011).

Indirect Impacts to Land Use

No additional indirect impacts would be expected beyond those listed in Section 4.2.2.

4.2.2.3 Alternative P

Direct Impacts to Land Use

Long-term significant adverse direct impacts to land use would be expected to occur under Alternative P. Alternative P is 17.4 miles with 13.3 miles on new alignment that would permanently remove agricultural land, forests, managed forests, developed areas, and wetlands and 2.5 miles would be on an existing abandoned railroad corridor. Under Alternative P, approximately 30 acres of existing land use would be permanently lost converted to highway and associated ditches in the 250-ft ROW limit of construction. Table 4-4 lists the land use and land cover that would be directly impacted under this alternative.

Table 4-4.
Alternative P land use converted to highway

<i>Land Use</i>	<i>Area (acres)</i>
Developed, Low Intensity	1.08
Developed, Open Space	28.85

Source: U.S. Department of Interior 2007

Existing development in the proposed ROW would be relocated or removed and would displace approximately six families. Two of the six families occupy mobile homes, and only replacement site would be required. No businesses or facilities would be displaced (C.H. Fenstermaker 2011).

Indirect Impacts to Land Use

No additional indirect impacts would be expected beyond those listed in Section 4.2.2.

4.2.2.4 Alternative Q

Direct Impacts to Land Use

Long-term significant adverse direct impacts to land use would be expected to occur under Alternative Q. Alternative Q would be a 19.8 mile alignment with 9.8 miles on an existing abandoned railroad corridor, 1.3 miles on existing roadway, and 8.7 miles on new alignment. Under Alternative Q, approximately 58 acres of existing land use would be converted to highway and associated ditches in the 250-ft ROW limit of construction. Table 4-5 lists the land use that would be directly impacted.

Table 4-5.
Alternative Q land use converted to highway

<i>Land Use</i>	<i>Area (acres)</i>
Developed, Open Space	52.48
Developed, Low Intensity	3.46
Developed, Medium Intensity	2.69

Source: U.S. Department of Interior 2007

Existing development in the proposed ROW would displace approximately 19 families. Fifteen of the 19 families occupy mobile homes and replacement sites for those homes would be required (C.H. Fenstermaker 2011).

Indirect Impacts to Land Use

No additional indirect impacts would be expected beyond those listed in Section 4.2.2.

4.3 WATER RESOURCES

4.3.1 No Build Alternative

Under the No Build Alternative, construction of the proposed roadway from I-12 to Bush would not be undertaken. Consequently, there would be no direct or indirect impacts to water resources within the ROW, or vicinity of, any of the alternative alignment's corridors.

4.3.2 *Build Alternatives Analysis*

The proposed I-12 to Bush roadway proposes work in wetlands and structural crossings along various waterways in the project area. In order to evaluate the direct and indirect impacts to water resources in the project area, hydrologic modeling, hydraulic analysis, and indirect wetland impact analysis was performed for the existing conditions, as well as for the four alternative alignments. Details of the methodology, modeling, and model results are provided in the Hydrology and Hydraulics (H&H) Report in Appendix G.

4.3.2.1 *Drainage Impacts*

The impact of structural crossings (bridge or culvert) on the hydrology and hydraulics of the existing system is dependent on a number of factors. The impacts created by each bridge and culvert crossing can vary significantly based on the conditions at each location. For example, two alternatives may cross the same channel at different locations and both require bridges, but the flows at the downstream location may be significantly greater, thus creating more impacts and requiring a much larger bridge. Another example is the limited impact from a culvert crossing located along an existing railroad corridor because the existing crossing already affected the channel system even though the proposed improvements could increase the length and size of the structure. For that reason, each culvert and bridge crossing was analyzed based on existing conditions, size of structure, and design flows. The locations of the proposed structural crossings for each alternative alignment are shown in Figures 4-1 through 4-4.

Alternative Q includes the least number of major structure crossings (25 crossings) and only three bridge crossings. Much of the alignment also follows existing roadway and the abandoned railroad corridor. Thus, many of the structures for this alternative would be replacements of existing structure crossings. The majority of Alternative J follows Airport Road and the abandoned railroad corridor, requiring only one bridge and five culverts on a new alignment.

Alternatives P and B/O both have greater lengths of roadway on new alignments, which increases the impacts to the existing drainage characteristics of the project area. The project area also drains in a northeast to southwest direction, which results in increased flows for the western alternatives and requires a larger number of structure crossings.

4.3.2.2 *Overland Sheet Flow Impact Analysis*

This section provides an analysis for the indirect impact of the proposed alignments on the natural overland sheet flow patterns. Field inspection of the project area indicates that a significant interaction exists between the floodplain and wetland areas and the drainage channel network. There is also evidence of inter-basin exchange during larger rain events. A one and two-dimensional coupled modeling approach (MIKE FLOOD) is a suitable tool for this application, which appropriately captures the exchange of flow between the overland areas and the channels and dynamically integrates those flow regimes. Details of the modeling methodology and setup are provided in Appendix G.

4.3.2.2.1 *Methodology*

The construction of roads across streams and wetlands areas especially in shallow systems such as eastern St. Tammany Parish may alter the natural drainage pattern and specifically the flow exchange between streams and surrounding wetland areas. The impact may cover large areas around the road alignment (Wright 2006). Full mitigation of such impacts or pursuing damage-sensitive construction alternatives can be challenging, time-consuming and costly. Therefore, it is

1 critical to assess the potential indirect impact of roadways on wetland areas. A list of common
2 hydrologic stressors on urban wetlands is provided below (Wright 2006):

- 3 • Changes to topography and canopy
- 4 • Changes to inundation (ponding)
- 5 • Increased hydrologic drought of riparian wetlands
- 6 • Changes to water level fluctuations
- 7 • Increased flow constrictions
- 8 • Changes to sedimentation and nutrient loading

9 These hydrologic stressors were evaluated individually for each alternative to determine the
10 indirect impact to the wetland areas located outside of each alignment's 250-ft ROW. All
11 analyses were performed on the entire drainage system to determine the total impacts. These
12 results were then filtered to focus on the impacts to wetland areas.

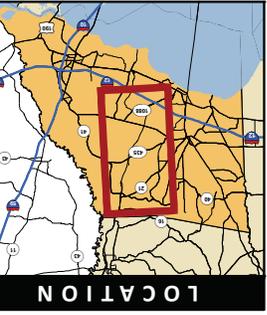
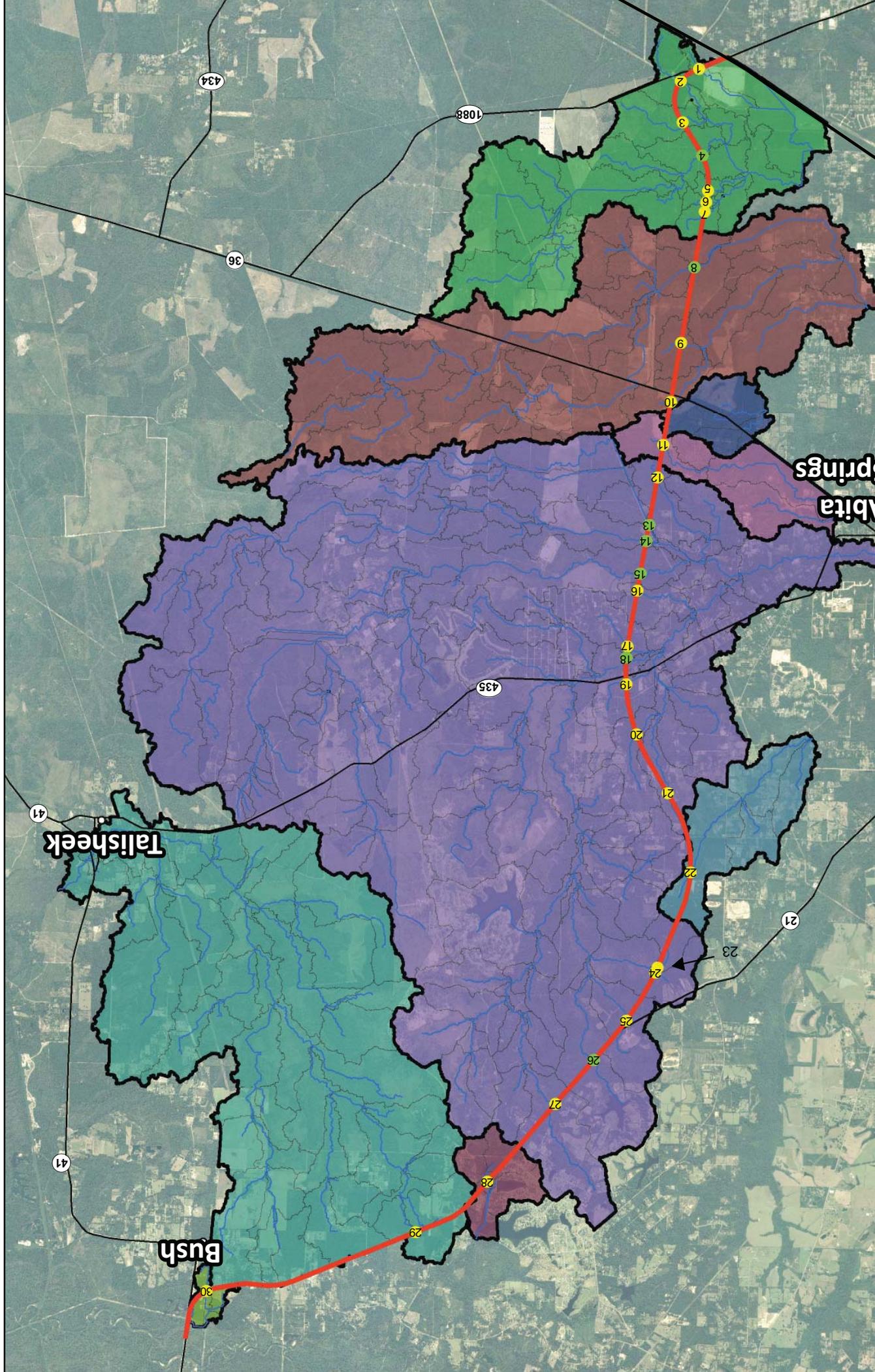
13 Wetlands in the project area were determined using hydric soil classifications and LiDAR data
14 (Figure 4-5). These wetland areas were used for analysis purposes herein. It should be noted that
15 the wetland areas identified in this analysis may not match with areas classified as wetlands in
16 other publications. In order to properly classify an area as a wetland a complete field investigation
17 and wetland delineation outside of the alternative ROWs is needed. Such extensive field
18 investigation was beyond the scope of this EIS.

19 **4.3.2.2.2 Impact on Topography**

20 Constructing a new roadway may require clearing of canopy and vegetation along its alignment.
21 Alignments constructed on undeveloped terrain change the existing canopy and topography.
22 Anytime topography is altered sheet flow is redirected. Therefore, when a proposed roadway is
23 placed along an existing roadway or abandoned railroad bed, the impact would be less significant.
24 However the potential for changes in ponding, drought, and inundation could still occur. These,
25 changes were analyzed and quantified for each alternative. Sensitive areas that currently lack the
26 capacity to absorb additional floodwater could suffer from artificial diversions. Long segments of
27 roadside ditches could become major conduits of stormwater and contaminants, and may
28 permanently alter the hydrology of nearby areas. Concentrated ditch flow and culverts may also
29 hinder the movement of water-dependent species. Additionally, changes to canopy and land use
30 could increase the peak discharge of a watershed. These changes are evident not only along areas
31 of new roadway, but as well as along existing roadways and railroad beds where the new roadway
32 would be widened and paved.

33 Each of the alternative alignments was assessed to determine the length of roadway constructed
34 on undeveloped land not previously altered. Table 4-6 summarizes these results.

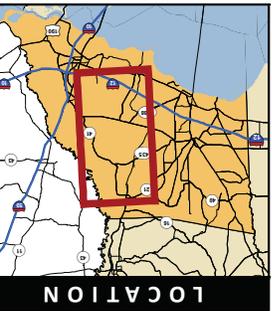
35



- 19 - Boque Chitto River Tributary
- 16 - Little Creek
- 15 - Ponchtola Creek
- 14 - Southwind Branch
- 13 - LA36 North Tributary
- 12 - Abita River
- 11 - Long Branch
- 8 - Simmons Creek



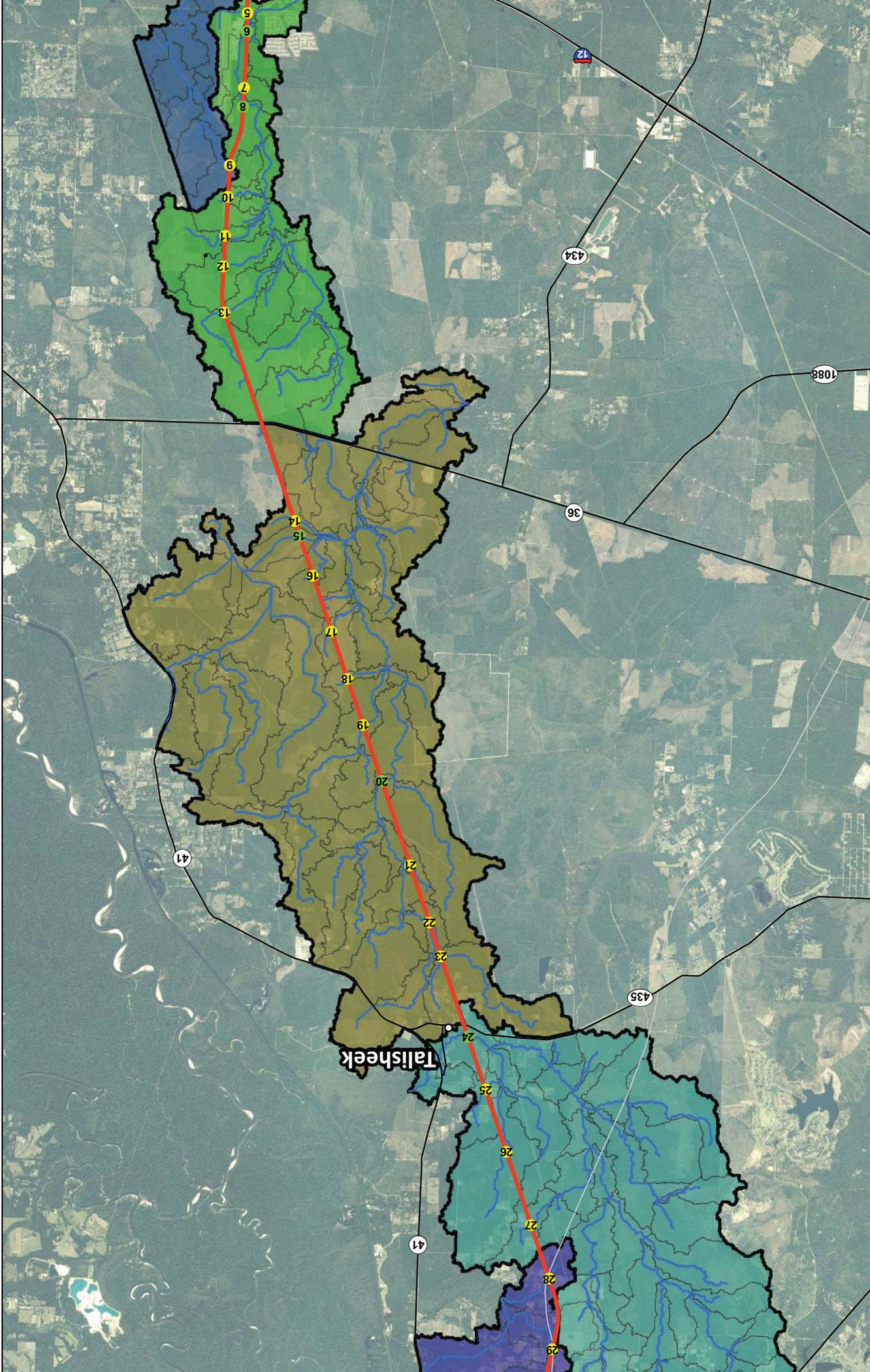
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LOCATION

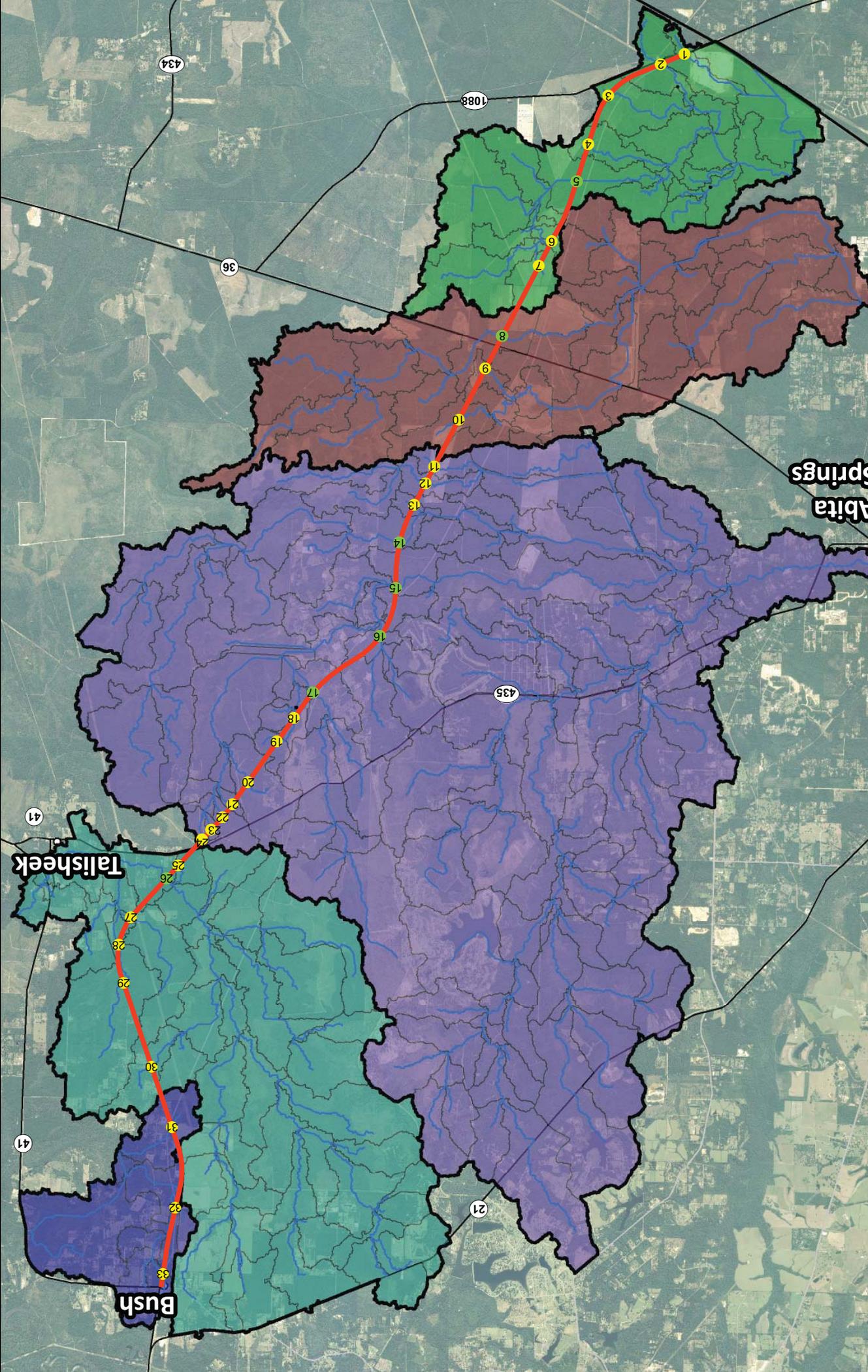


- 1 - Bayou Liberty Tributary
- 2 - Bayou Liberty Tributary
- 5 - Bayou LaCombe
- 6 - Talisheek Creek
- 7 - Little Brushy Branch





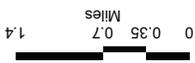
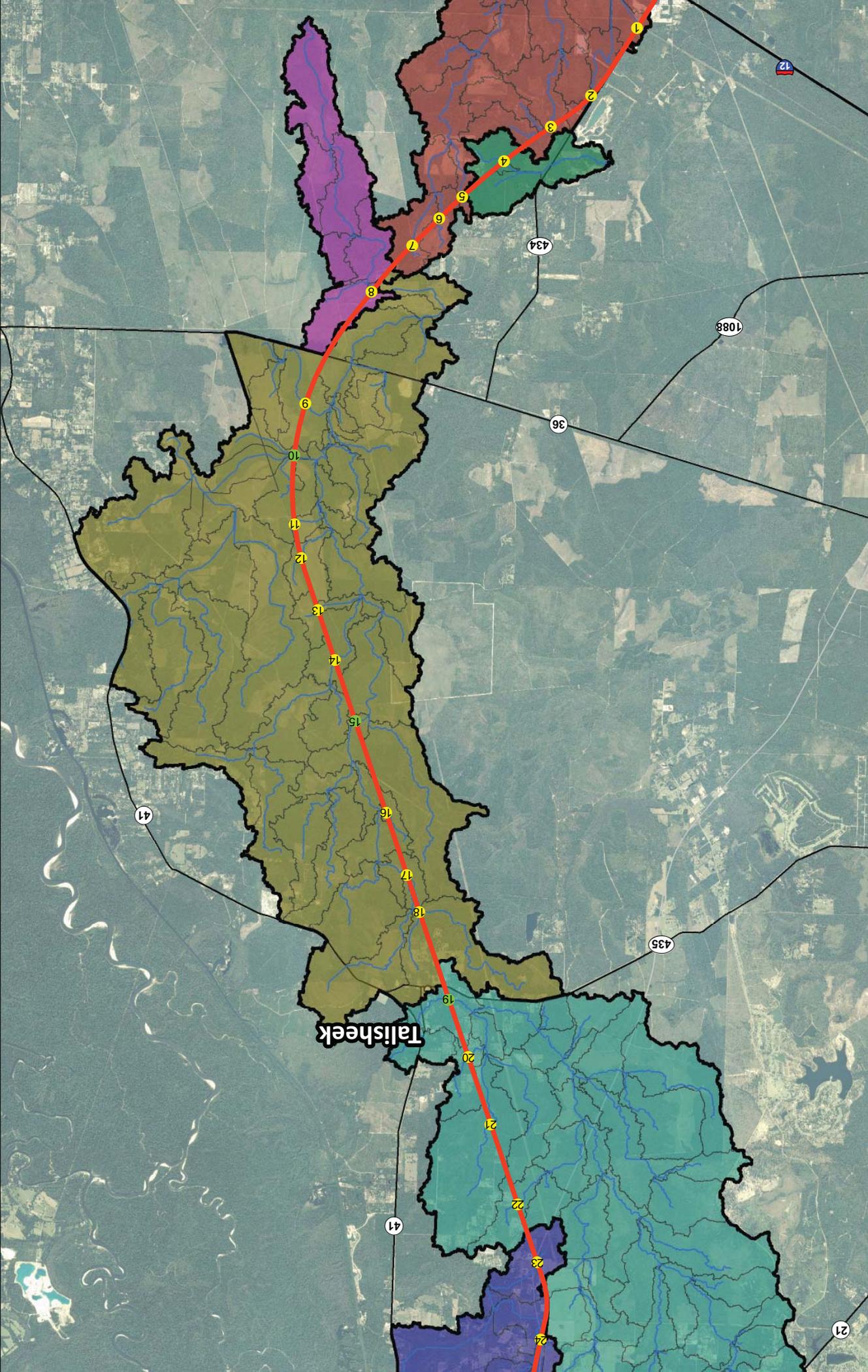
Fenstermaker



- ALT P Basins**
- 16 - Little Creek
 - 15 - Ponchtolawa Creek
 - 12 - Abita River
 - 7 - Little Brushy Bayou
 - 6 - Talisheek Creek



Fenstermaker



- 17 - Bayou Lacombe Tributary
- 7 - Little Brushy Branch
- 6 - Talisheek Creek
- 5 - Bayou Lacombe
- 4 - Bayou Liberty
- 3 - Big Branch Bayou

Figure 4-5 Wetland Areas Identified by Hydric Soil & LiDAR Data

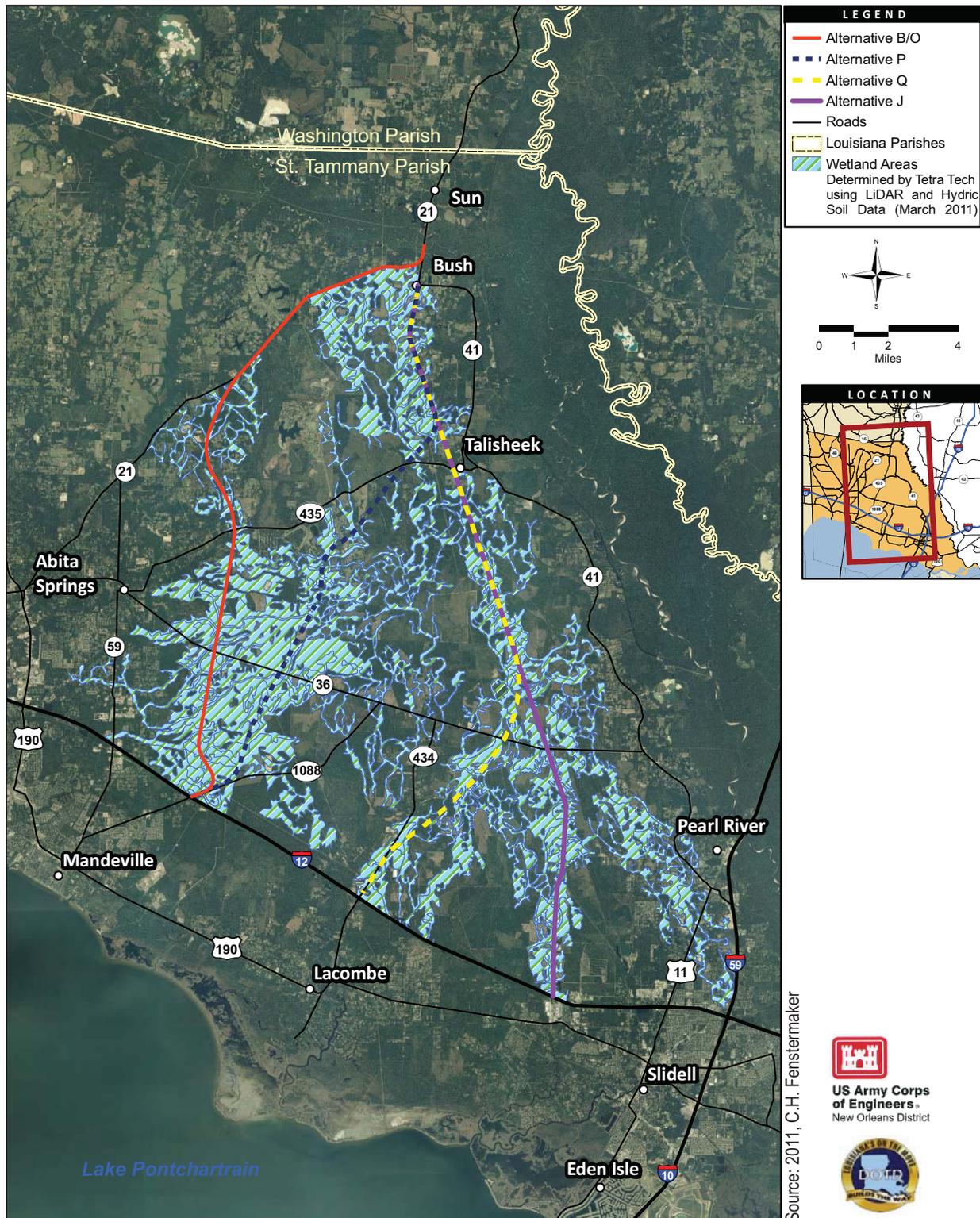


Table 4-6.
Length of new roadway constructed on undeveloped land

Alternative	Length of New Roadway (Miles)
Alternative B/O	12.5
Alternative J	5.4
Alternative P	14.8
Alternative Q	8.7

In addition to the impact on canopy and topography by each alignment, the wetland area along the length of each alternative alignment was delineated and can be found in Appendix H. Table 4-7 summarizes the results of the direct impacts on the wetlands within the 250 ft ROW.

Table 4-7.
Direct wetland impacts within the 250 ft right-of-way of each alternative

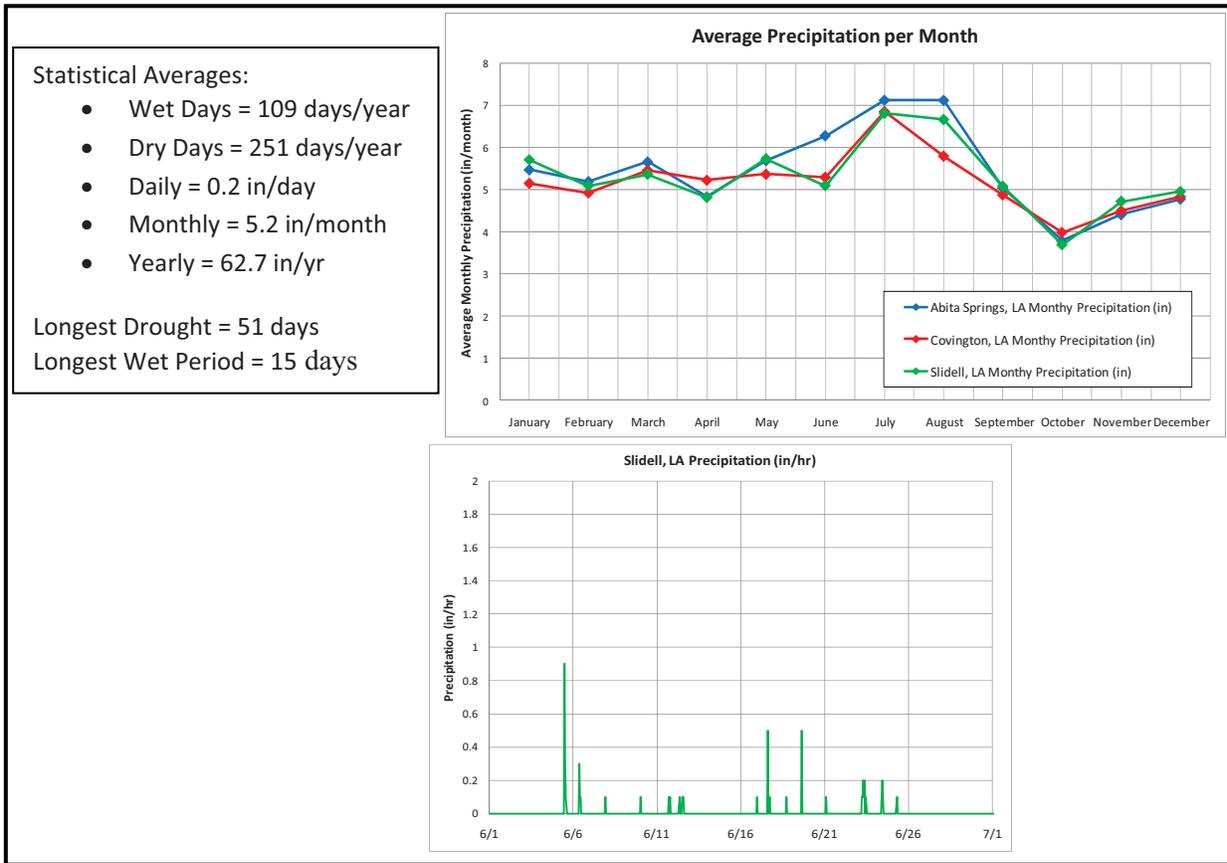
Alternative	Direct Wetland Impacts (acres)
Alternative B/O	385
Alternative J	373
Alternative P	358
Alternative Q	305

4.3.2.2.3 Impact on Inundation (Ponding)

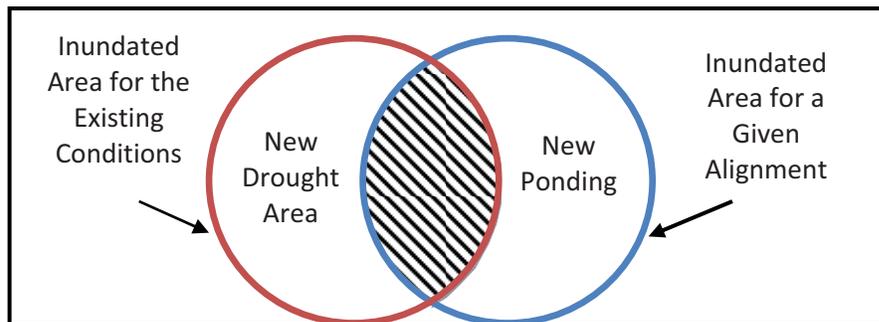
Changes to the extent or inundation (ponding) duration of wetland areas may occur when obstructions such as roadways alter the natural sheet flow of water. Altering the ponding duration (increase or reduction) leads to changes, often undesirable, in wetland type, function, and quality, as well as to the native plants and animals (Wright 2006). The duration an area remains submerged is a critical parameter that impacts the functionality of wetlands.

Historical records of precipitation were obtained from three rainfall stations located within St. Tammany Parish (Slidell, Abita Springs, and Covington, Louisiana). These stations recorded data from 1900 to 2010, with a common period of 1973 to 2010. A statistical analysis on the rainfall data was performed (see Figure 4-6). Based on the available records, the average monthly rainfall for the St. Tammany area is approximately 5.2 inches. A typical month during the growing season with an average precipitation of 5.2 inches was selected to investigate the impact of each alternative alignment on the inundation (ponding) pattern of the surrounding wetland areas.

The inundation of wetland areas were analyzed for the existing conditions and compared to each alternative alignment. Figure 4-7 illustrates how each alignment may impact the wetland inundation. Ponding was defined as areas inundated for three consecutive days with a depth greater than one inch. The change (expressed in acreage) to the inundated areas is used to express the impact of a given alignment. As shown in Figure 4-7, the comparison between the existing



1
2 **Figure 4-6. Precipitation statistics and average monthly precipitation**



3
4 **Figure 4-7. Schematic of how the impact on ponding and drought was computed**

5 conditions and a given alignment reveals areas that have not been impacted, new inundated areas,
6 and areas that have been drained as a result of constructing a given alignment. This analysis was
7 repeated with adjusting the definition of ponding to five days and seven days.

8 Wetland functions and services and the plant and animal communities that inhabit it are largely
9 determined by hydrology (CWP 2006). Wetland functions include water storage, transformation
10 of nutrients, growth of living matter, and wildlife habitat. Construction of the roadway could
11 impede channel and overland flow resulting in oversaturated and ponded areas in adjacent
12 wetlands. A vegetative shift could be observed with increased duration of ponding from upland to
13 more wetland tolerant plants. An increase in ponding duration could cause a natural population

1 decline of less water-tolerant species and an increase in species more adaptive to a wet
 2 environment. This shift in vegetative complex could directly impact the pine flatwood wetlands
 3 throughout the project area. Pine flatwoods in the area could decline in coverage and be replaced
 4 with bayhead swamp species (see Section 3.4.1.1). Local university wetland scientists and
 5 researchers were consulted to determine the critical duration that would alter the functionality of a
 6 wetland. An exact duration was not agreed on among the scientists, and ranged from three to
 7 seven days.

8 The results for the three, five, and seven-day inundation analyses are summarized in Table 4-8,
 9 Table 4-9, and Table 4-10, respectively. Figure 4-8 shows the areas where the wetland inundation
 10 (ponding) has been impacted. In Figure 4-8, the inundation duration used was seven days. Maps
 11 with inundation durations defined as three and five days can be found in Appendix G. Overall, the
 12 analysis shows that the ponding duration is not a critical factor in terms of identifying the acreage
 13 of wetlands impacted.

14 Long-term moderate indirect adverse impacts to wetlands as a result of ponding duration could
 15 occur under the Build Alternatives. Changes to hydrology could reduce the ability of wetlands to
 16 provide existing functions and services. Impacts to wetland hydrology could degrade water
 17 quality, constrict flows, increase flooding, increase peak flows, increase water level fluctuations,
 18 and reduce water storage capacity.

19
 20 **Table 4-8.**
 21 **Inundation impact: 3 days inundation duration**

Alternative	Increase in Wetland Inundation (acres)
Alternative B/O	427
Alternative J	406
Alternative P	240
Alternative Q	290

22 **Table 4-9.**
 23 **Inundation impact: 5 days inundation duration**

Alternative	Increase in Wetland Inundation (acres)
Alternative B/O	477
Alternative J	396
Alternative P	264
Alternative Q	268

24
 25
 26 **Table 4-10.**
 27 **Inundation impact: 7 days inundation duration**

Alternative	Increase in Wetland Inundation (acres)
Alternative B/O	385
Alternative J	438
Alternative P	297
Alternative Q	307

4.3.2.2.4 Hydrologic Drought Impact Analysis

Hydrologic drought events are defined as wetland areas that remain dry for three consecutive days. To investigate the sensitivity of the results to the duration of the drought used herein, the same analysis used for inundation impacts was repeated with adjusting the drought duration to five days and seven days.

The hydrologic drought areas identified in this analysis represent the areas that showed reduced surface water retention. Potential impacts that could occur due to hydrologic drought include ecological shifts both within plant and animal species. Pathways for the movement of water-dependent species may also be compromised by decreases in surface water retention. Additionally, depending on the duration of the dry-out changes to the soil moisture content could occur which subsequently impact the runoff and groundwater levels (depending on depth of water table).

Higher peak flows and improved drainage could result in a wider fluctuation of water levels in adjacent wetlands. Those fluctuations would return to baseline conditions more quickly than in an undeveloped wetland area (CWP 2006). When the seasonal water level fluctuation is altered in a wetland, mortality of existing plant communities could occur in response to the new hydroperiod and change the ecosystem type. An increase in drought events could result in a natural vegetative shift from water-tolerant vegetative species to those species more adapted to an upland environment. This change in vegetative complex could reduce the amount of wetlands throughout the study area, especially those located in the vicinity of the new roadway.

The hydrologic drought analysis identified the acres of wetlands experiencing hydrologic drought as a result of a given alignment compared to the existing conditions as summarized in Tables 4-11 through 4-13. Figure 4-9 shows wetland areas experiencing seven-day drought for all four proposed alignments. As can be seen, the drought areas are primarily located along the alignments. Appendix G provides maps with drought durations defined as three and five days.

Long-term moderate indirect adverse impacts to wetlands as a result of drought could occur under the Build Alternatives. Changes to hydrology could reduce the ability of wetlands to provide existing functions and services. Impacts to wetland hydrology could degrade water quality, constrict flows, increase flooding, increase peak flows, increase water level fluctuations, and reduce water storage capacity.

Table 4-11.
Hydrologic drought impact: 3 days hydrologic drought duration

Alternative	Increase in Wetland Drought (acres)
Alternative B/O	238
Alternative J	261
Alternative P	149
Alternative Q	126

Table 4-12.
Hydrologic drought impact: 5 days hydrologic drought duration

Alternative	Increase in Wetland Drought (acres)
Alternative B/O	181
Alternative J	239
Alternative P	134
Alternative Q	124

Table 4-13.
Hydrologic drought impact: 7 days hydrologic drought duration

Alternative	Increase in Wetland Drought (acres)
Alternative B/O	184
Alternative J	243
Alternative P	129
Alternative Q	135

4.3.2.2.5 *Water Level Fluctuations Impact Analysis*

Water level fluctuation (WLF) is the difference between maximum and minimum water levels in a wetland for a given period of time. This is often used to quantify a wetland's hydroperiod (Wright 2006). Water level typically increases in response to moderate or large storm events but quickly returns to base levels. These changes in water level are commonly referred to as the *bounce* in water levels during and after a storm event. Research has shown that changes in WLF on wetlands have caused a consistent decline in diversity and often an increase in invasive species (Wright 2006).

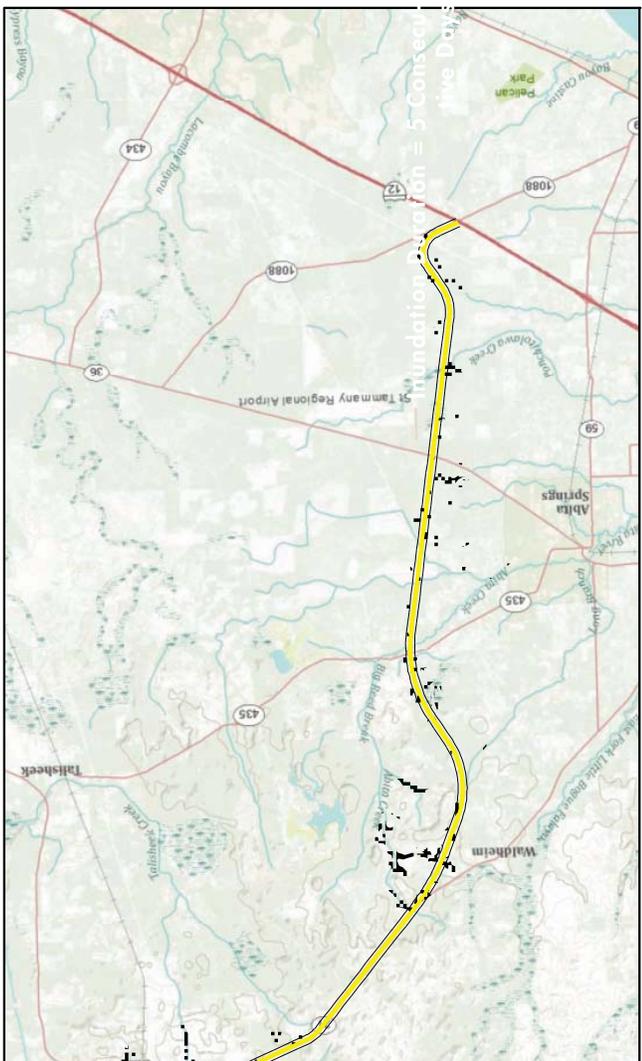
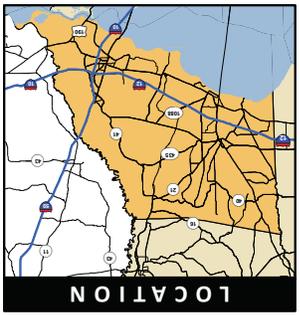
Stream capacity is directly related to channel characteristics such as geometry and slope, and without survey data the impacts to stream capacity could not be quantified. However, potential impacts may occur when channel slopes or geometry are changed due to construction, channel mining, or erosion. These impacts could increase or decrease stream capacity depending on the types and extent of channel geometry changes. In addition, highways tend to act as debris and refuse collectors and there is the potential for latent capacity reductions caused by this debris buildup.

Flooding potential along laterals would not significantly change due to structure crossing design parameters. Culverts were designed for a 50-year storm event and bridges were designed for a 100-year storm event. Culverts have the tendency to fill in over their design life and there is always the potential for storm-specific debris and timber buildup, particularly following tropical weather events. A detailed assessment of such variable conditions was beyond the scope of this project and might be considered in the final evaluation and design. Also, a base flood impact analysis during the design phase is required by FEMA for all structure crossings.

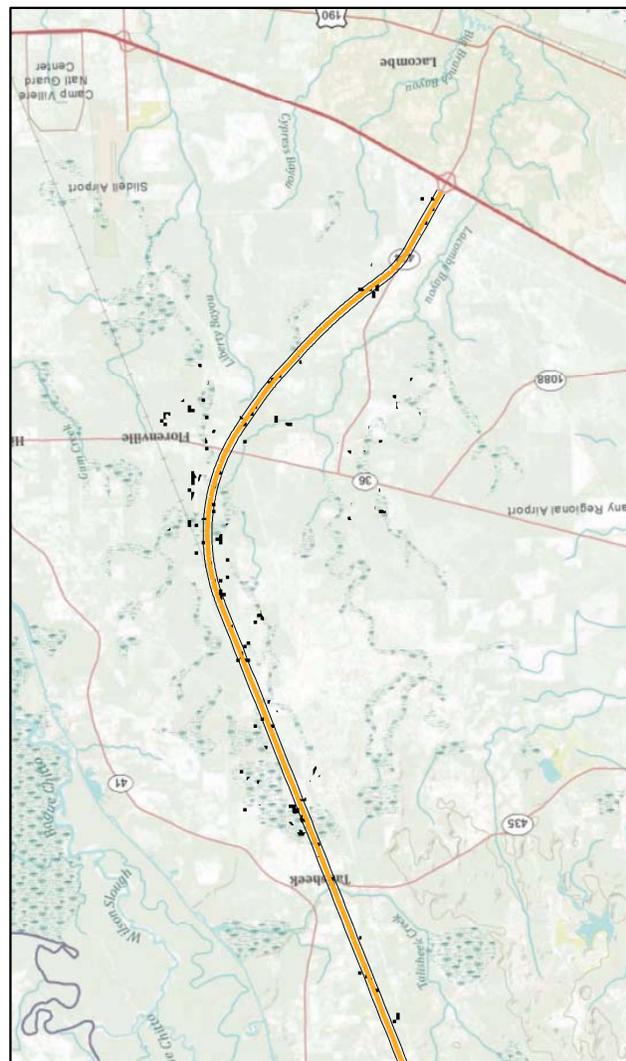
ALTERNATIVE P 

IMPACTED AREA 

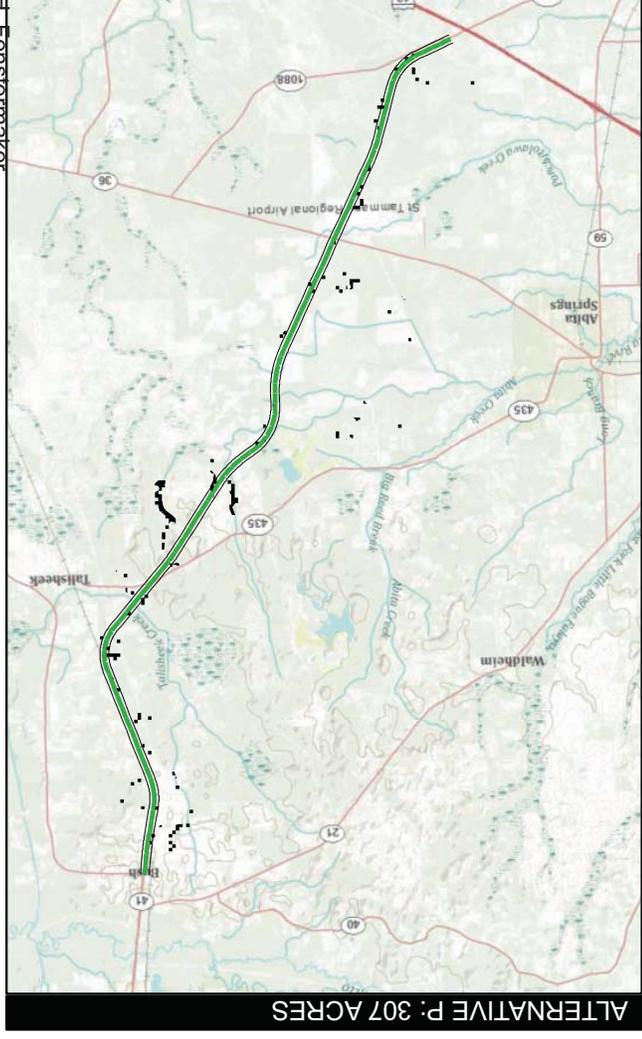
Inundation Duration = 5 Consecutive Days



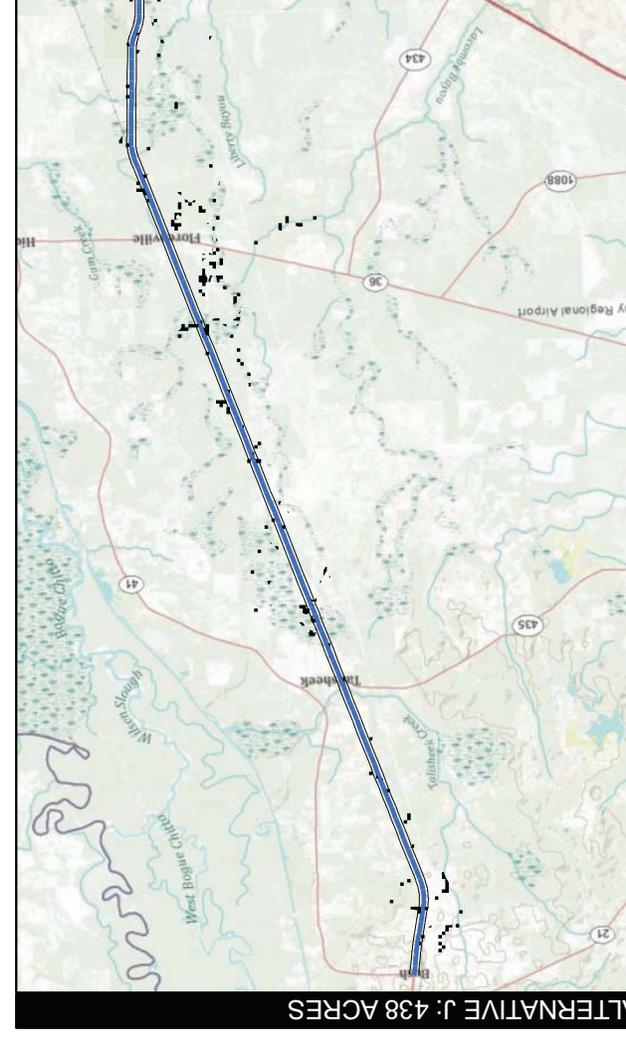
ALTERNATIVE P: 307 ACRES



ALTERNATIVE J: 438 ACRES



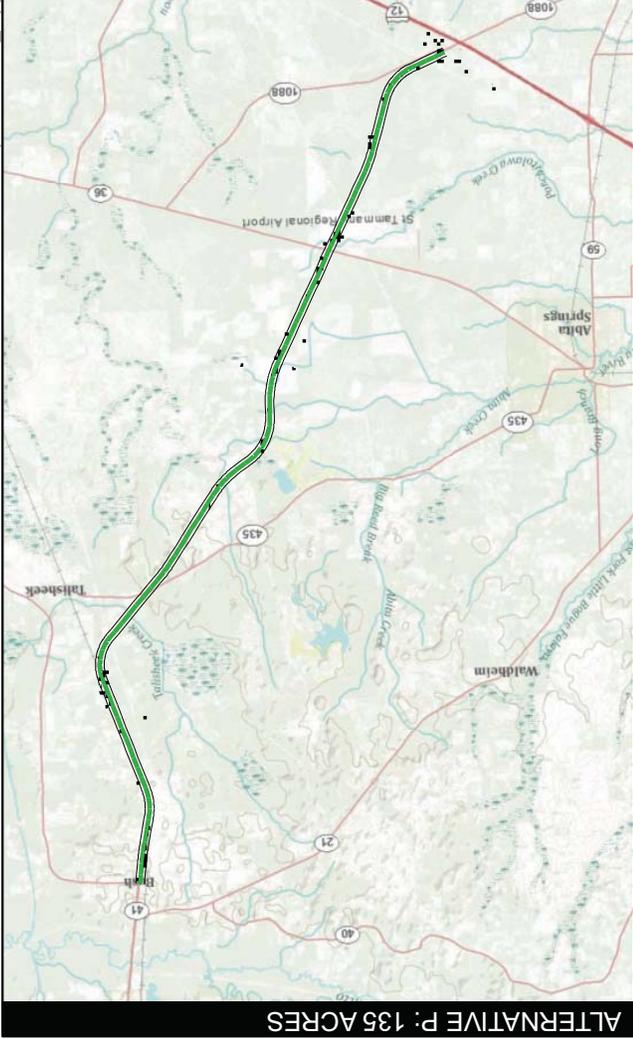
ALTERNATIVE P: 307 ACRES



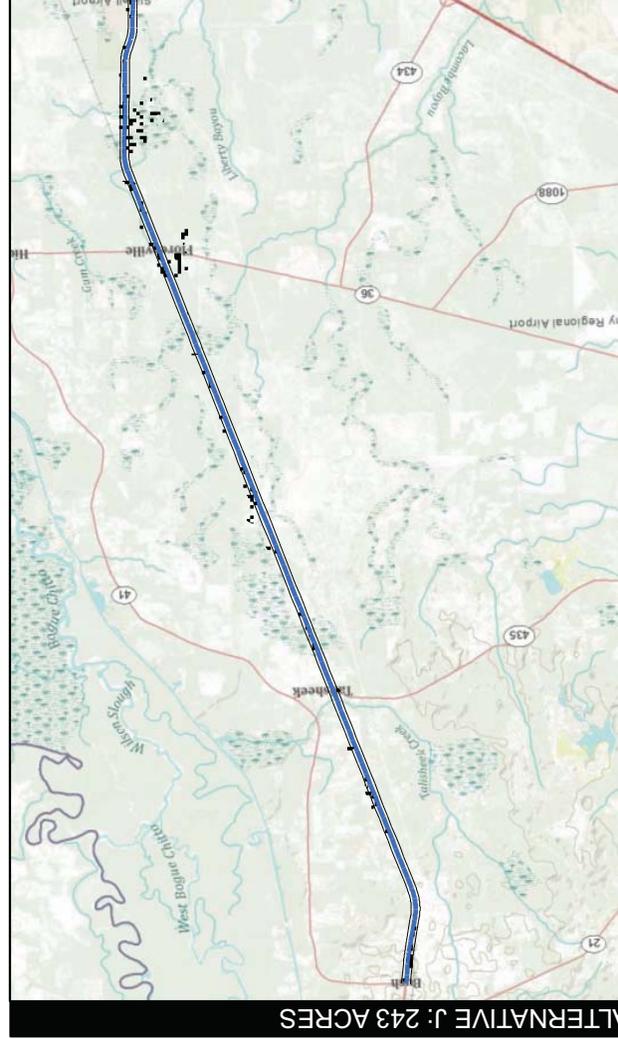
ALTERNATIVE J: 438 ACRES



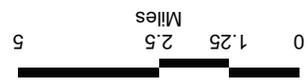
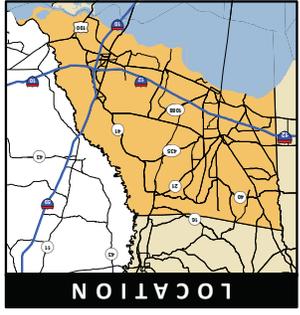
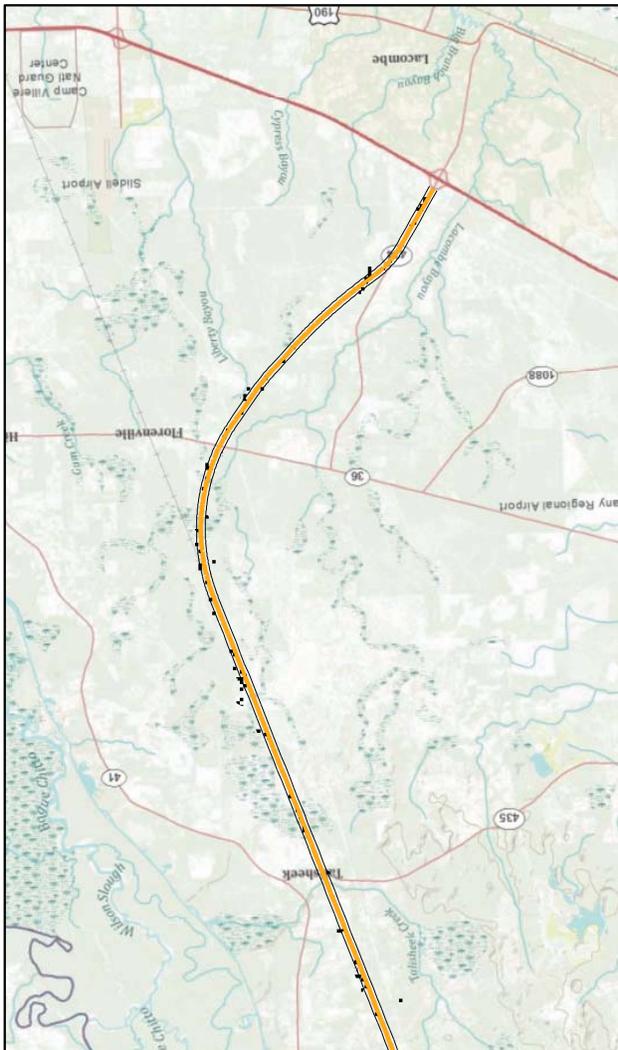
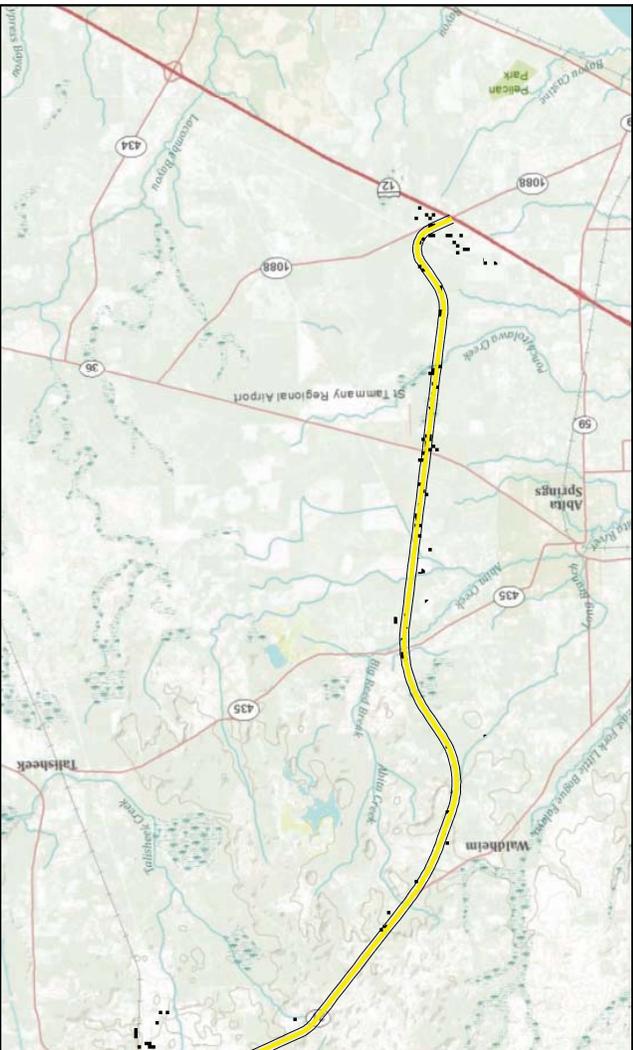
H. Fenstermaker



ALTERNATIVE P: 135 ACRES



ALTERNATIVE J: 243 ACRES



Hydrologic Drought Duration = 5 Consecutive Days

- IMPACTED AREA
- ALTERNATIVE P

1 Overland sheet flow fluctuations due to roadway placement were examined in predefined wetland
 2 areas. An increase in flood potential is typically expected upstream of proposed roadways, and a
 3 decrease is expected downstream. The Build Alternatives would impede natural overland
 4 drainage patterns; however, equalizer pipes and other drainage structures were placed a maximum
 5 1,250 feet apart to limit overland sheet flow interruptions. Headwater cutting was not examined,
 6 as it requires a velocity analysis. Velocities are sensitive to channel geometries and survey data
 7 was not collected.
 8

9 The WLF impact analysis was performed for the 2, 25, and 100-year storm events. Table 4-14
 10 presents the total rainfall accumulations for each storm frequency. The tailwater values at the
 11 outlet of the drainage basins were estimated using the St. Tammany Parish Preliminary FEMA
 12 FIS profile data.

13 **Table 4-14.**
 14 **Frequency storm precipitation**

Frequency Storm	Rainfall Depth Inches
2-Year	4.8
25-Year	9.6
100-Year	12.6

15
 16
 17 Changes to the WLF patterns between the existing conditions and each alternative were
 18 determined. A change in the WLF was registered only if it exceeded an increase or decrease of
 19 one inch. The total area registering such a change was tallied up for each alternative. This
 20 tolerance was set based on the resolution and sensitivity of the numerical model. Tables 4-15
 21 through 4-17 provides the wetland areas that experienced a change in the WLF. Figure 4-10
 22 shows the wetland areas that experienced changes in WLF for the 2-year storm event. Appendix
 23 G provides similar maps for the 25-year and 100-year storm events.

24 **Table 4-15.**
 25 **Water level fluctuations impact for the 100-year storm**

Alternative	WLF Impacted Wetland Areas (acres)
Alternative B/O	2,353
Alternative J	3,685
Alternative P	2,408
Alternative Q	2,302

Table 4-16.
Water level fluctuations impact for the 25-year storm

Alternative	WLF Impacted Wetland Areas (acres)
Alternative B/O	1,773
Alternative J	2,700
Alternative P	1,534
Alternative Q	1,626

Table 4-17.
Water level fluctuations impact for the 2-year storm

Alternative	WLF Impacted Wetland Areas (acres)
Alternative B/O	1,128
Alternative J	1,838
Alternative P	860
Alternative Q	1,237

4.3.2.2.6 *Flow Constrictions Impact Analysis*

The most common type of flow constriction is caused by the placement of hydrologic structures to convey water underneath a roadway. The hydrologic changes associated with flow constrictions contribute to increase in ponding, drought, and water level fluctuations both upstream and downstream of the hydraulic structures (Wright 2006). The loss of capacity of these hydrologic structures overtime is mainly a result of sediment accumulation due to a lack of routine maintenance. If the structures are cleaned out on a routine maintenance schedule, impacts to flow would be expected to be minimal as compared to if the structures are not maintained.

All road crossings were designed according to LADOTD standards for the 50-year storm event (future conditions) with a one foot allowable differential head. Detailed road crossing analysis was done and presented in Appendix G.

4.3.2.2.7 *Summary of Indirect Wetland Impacts*

Three primary indicators of hydrologic stress were analyzed for each alternative. They included (2-YR WLF), increased ponding (7 day inundation), and decreased ponding (7 day drought), as defined previously. It should be noted that a wetland area could be affected by more than one stressor. The total indirect wetland impacted area was determined by merging the impacted wetland areas for the seven day inundation duration and drought periods and the areas that showed change in WLF for the 2-year storm event. The total indirect wetland impacted area was calculated using GIS. The total area was the union of the three separate stress indicators. A summary table of the total indirect wetland impacted acreage can be found in Table 4-18. A map showing the areas where indirect wetland impacts occurred can be found in Figure 4-11.

Table 4-18.
Indirect wetland impacts acreages

Alternative	Total Indirect Wetland Impacts (acres)
B/O	642
J	787
P	509
Q	577

Long-term direct major adverse impacts to sensitive natural communities as a result of hydrologic changes in the project area would be expected under the Build Alternatives. Pine flatwoods and savannas are sensitive habitats that may be removed and converted to roadway. Those areas provide habitat for several species being considered for listing as threatened or endangered, including Bachman's sparrow, diamondback rattlesnake, flatwoods salamander, gopher frog, pine snake, and southern hognose snake. Less mobile birds, amphibians, and reptiles inhabiting the areas where staging or construction would occur could be displaced or killed if this alternative was implemented. Pine flatwoods are also known for their richness in vegetation diversity with orchids, insectivorous plants, and other vegetation endemic only to this habitat. Loss of this habitat could subsequently result in the loss of rare plants including parrot pitcher plant (*Sarracenia psittancina*) and spreading pogonai (*Cleistes bifaria*) found only in pine flatwoods and savannas.

Indirect impacts to mitigation banks, pine wetlands, flatwoods, and savannas could occur under the Build Alternative. Disturbed hydrology in those habitats increases susceptibility of pine communities to invasive vegetation including Chinese tallow and cogon grass. Old-field weed species may germinate following disturbances which could reduce fire frequency and encourage hardwood growth.

4.3.2.3 Water Quality Impact Analysis

Impacts to water quality as a result of changes in sedimentation and nutrient loading within channels may occur as a result of urbanization and other alterations to a natural wetland system. These changes are directly tied to velocities and other hydraulic parameters within the streams. Since no channel surveys are available at this phase, it is not possible to quantify the indirect impacts to water quality due to sediment deposition, pollutant accumulation, or nutrient discharges. As such, impacts to water quality are described below in qualitative terms.

In general, the greater the amount of construction activities near drainage pathways the greater the potential for sediment and erosion related problems. Some examples include failed silt fencing, construction tracking, cross drain washouts, prolonged de-watering activities, and violent runoff from impermeable surfaces. Increased hydrocarbon concentrations and turbidity as a result of traffic and construction staging areas could also pose a threat to the environment. General trash accumulation could also potentially increase as a function of the length of roadway, and the amount of development that the roadway attracts.

Sedimentation could degrade water quality by increasing turbidity, suspended solids, and pollutants. Sediment deposition could also reduce floodwater storage capacity, change water depths and flow patterns, and block water inflow or outflow paths. Additionally, large volumes of sediment could adversely impact vegetative species by cutting off oxygen to their roots, and

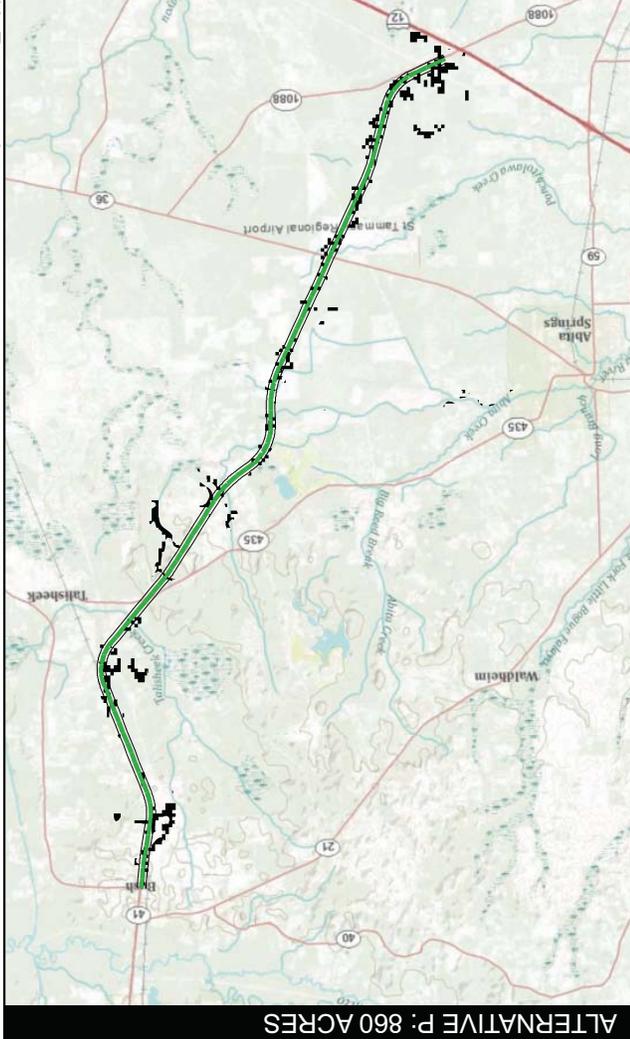
1 could bury the eggs of aquatic organisms that use streams in the project area for breeding
2 purposes.

3 Suspended solids in stormwater increase turbidity and transport other pollutants adsorbed to
4 sediment and long-term accumulation of sediment reduces storage capacities of ponds, lakes, and
5 wetlands. Heavy metals are toxic to many aquatic organisms and bioaccumulate in tissues which
6 could pose human health risks to humans. Introducing increased levels of nutrients into a nutrient
7 poor habitat could result in a vegetative shift. Rapid increases in those populations deplete
8 oxygen levels to the extent that fish and other aerobic organisms die off. Bioaccumulation of
9 pesticides in fish and sediment may kill off aquatic organisms after long periods or pose human
10 health risks. PAHs include compounds found in petroleum products that are known to be
11 carcinogenic. Those compounds pose human health risks if drinking water sources or fish become
12 contaminated with them. PAHs in streams in lakes adhere to sediment and bioaccumulate in
13 stream bottoms which could impact benthic organisms and bottom feeders (CEMVN 2008).

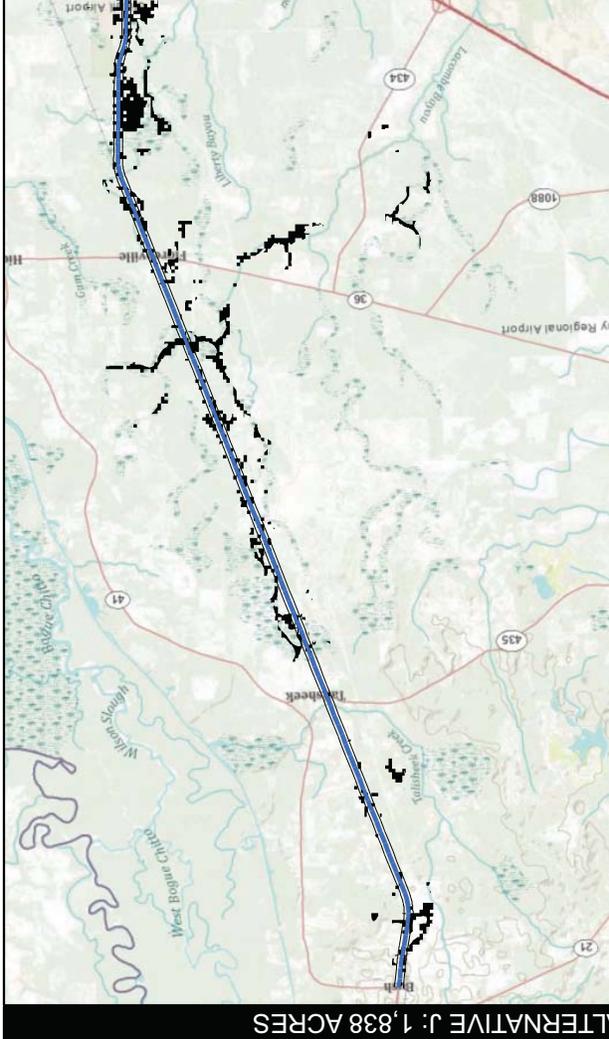
14 Short-term localized direct minor adverse impacts to water quality and aquatic organisms could
15 be expected during construction of the Build Alternatives. Roadway construction would leave
16 large areas of earth unprotected and sloping work could increase the potential for erosion of the
17 surface material during storm events. Roadside ditches would be constructed in non-wetland
18 areas and these ditches could carry eroded material from the construction site down-slope
19 entering downstream wetlands or waterways where sediment would be deposited. Turbid water
20 interferes with respiration and filter-feeding behavior of macroinvertebrates as well as reduces
21 fish feeding success due to visual impairment. Turbidity also decreases photosynthesis for
22 primary producers. Sediment deposition fills pools and interstitial spaces in the stream bottom,
23 choking out aquatic vegetation, and reduces survival rates for macroinvertebrates and juvenile
24 fishes. Turbidity resulting from sediment could reduce light penetration for submerged aquatic
25 vegetation critical to stream health and could increase stream temperatures through energy
26 generated from light reflected off suspended sediments. Sediment could physically alter habitat
27 by destroying the riffle-pool structure in stream systems, and smothering benthic organisms such
28 as clams and mussels. Finally, sediment transports many other pollutants that could affect aquatic
29 organisms in receiving streams. Increased nutrients and hydrocarbons in the receiving streams
30 could create algal blooms that deplete oxygen from the water to low levels which could become
31 toxic to aquatic life (CEMVN 2008). BMPs would be employed to minimize sediment from
32 entering receiving streams.



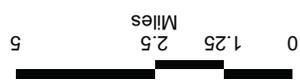
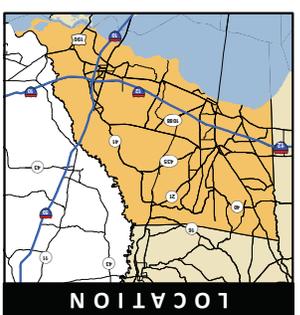
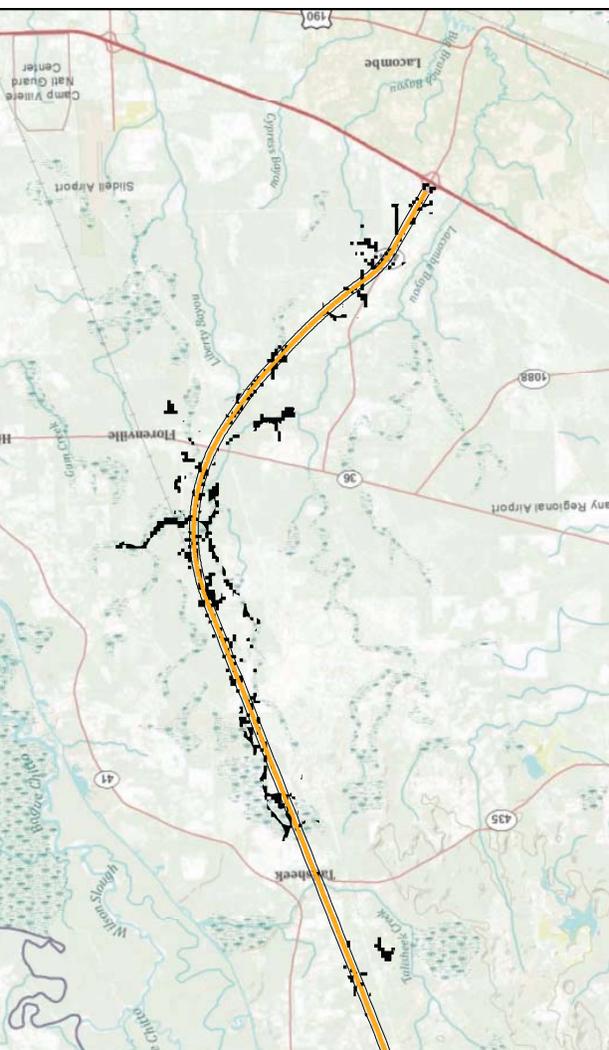
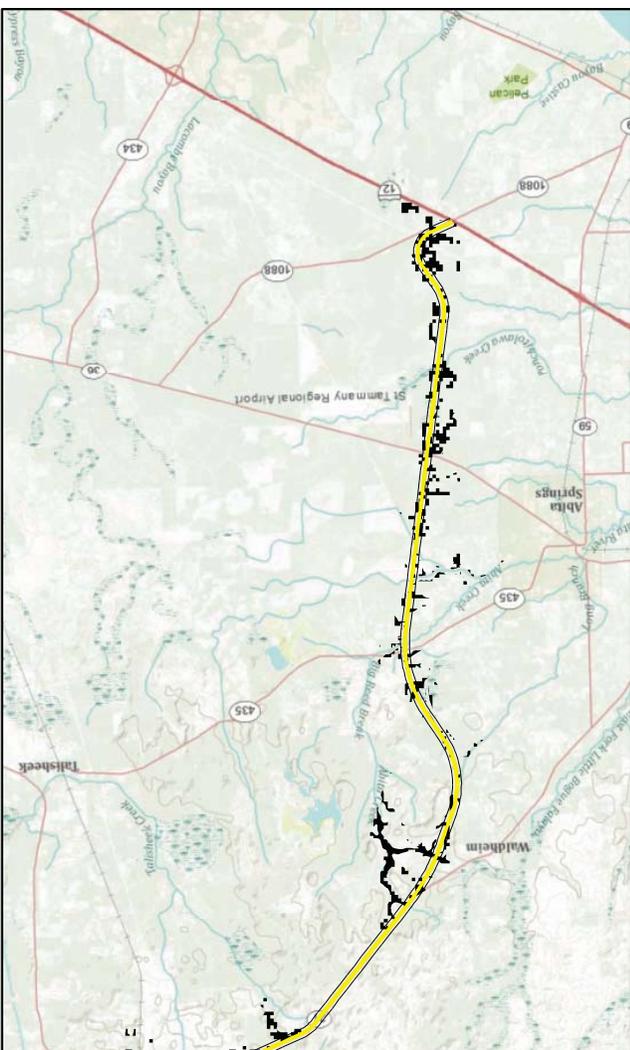
H. Fenstermaker



ALTERNATIVE P: 860 ACRES



ALTERNATIVE J: 1,838 ACRES

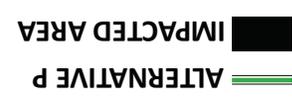
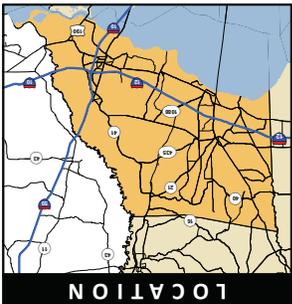
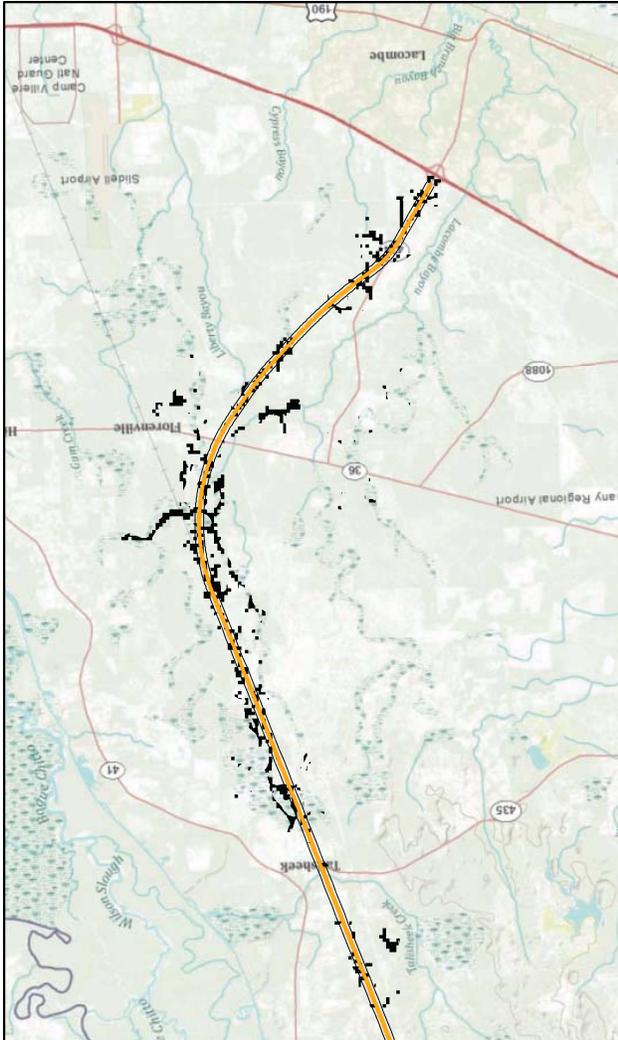
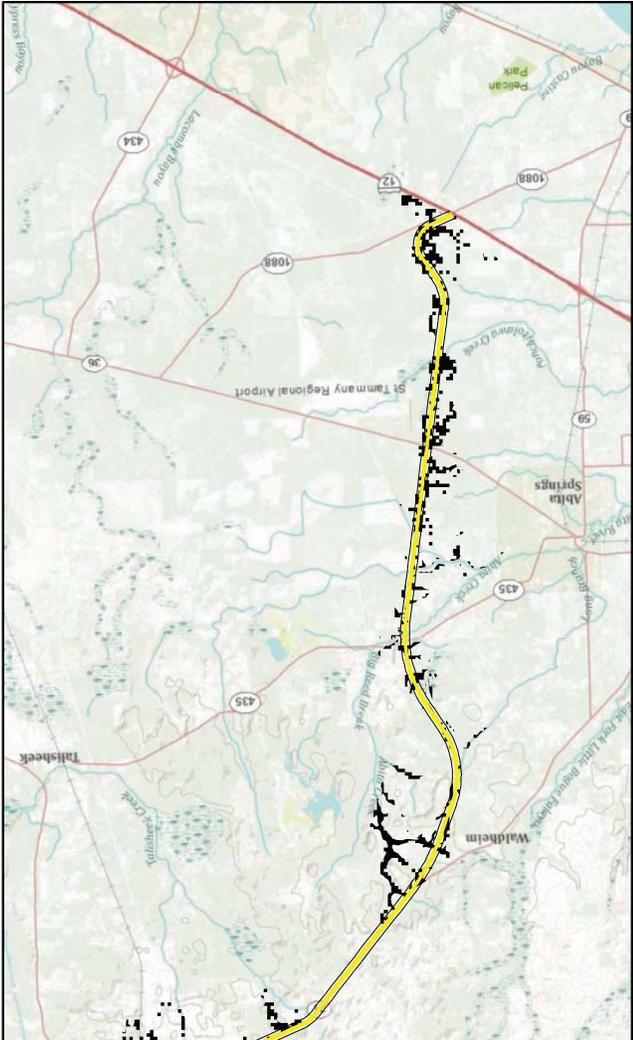
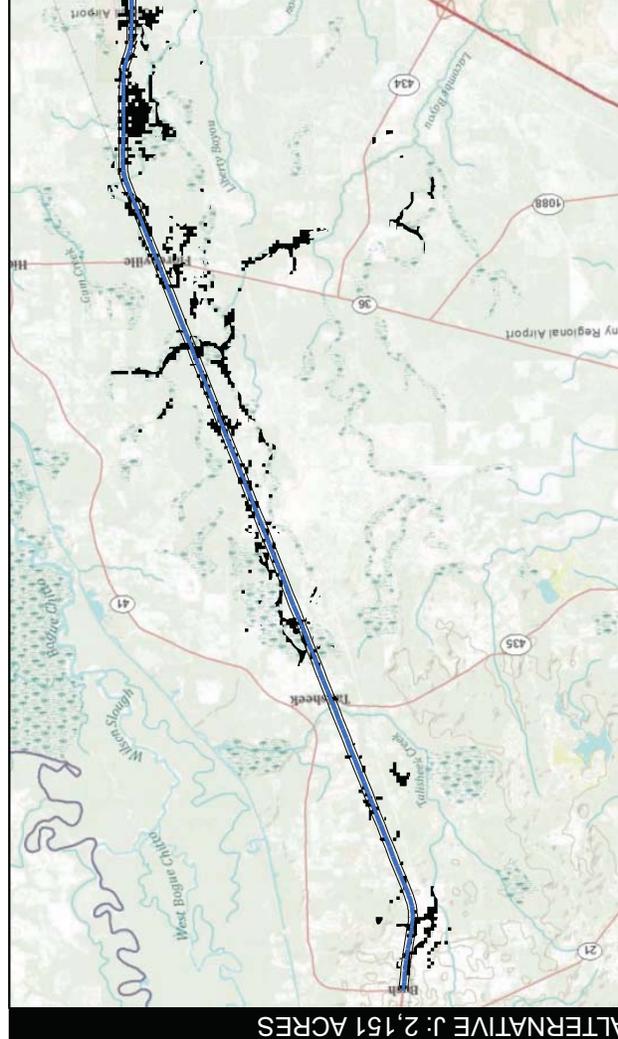
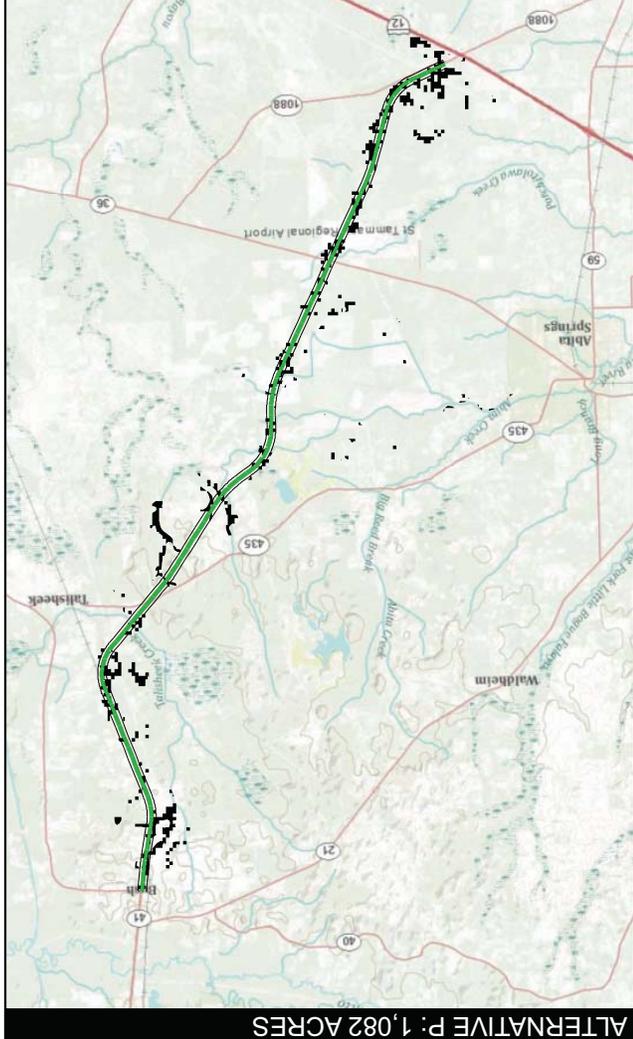


Legend:

- IMPACTED AREA (Black rectangle)
- ALTERNATIVE P (Green double line)



Topographic Map



4.3.2.4 Groundwater Impacts

Groundwater recharge and discharge impacts due to roadway placement cannot be fully quantified at this time, but are discussed qualitatively. Local base flow depths generally decrease with the channel improvements and re-alignments that accompany a typical roadway project. Culverts also may potentially become blocked, thereby reducing the base flow downstream while increasing the ponding levels upstream of the roadway. In general, groundwater recharge is a function of soil permeability which would be altered by the proposed roadway due to placement of impermeable materials, changes in ground slope, and soil compaction. The impact extents are thought to be minimal on a large, aquifer-size scale. Groundwater discharge is a function of soil permeability and porosity which may be affected by the proposed roadway. This potential disruption of near surface groundwater discharge may affect the base flow in nearby streams, particularly evident during periods of low flow. Hillside bogs may be adversely impacted since they are sensitive to variations in overland and groundwater discharge. Baseflow impacts typically occur when there are changes to land use or physical characteristics of the overland topography and channel geometry. Additional information would be needed to quantify these impacts.

4.4 ECOLOGICAL RESOURCES

4.4.1 No Build Alternative

Under the No Build Alternative, construction of the proposed roadway from I-12 to Bush would not be undertaken. Consequently, there would be no direct or indirect impacts to ecological resources within the ROW, or vicinity of, any of the alternative alignment's corridors.

4.4.2 Build Alternatives

Direct and indirect impacts to ecological resources would be expected to be similar for each of the Build Alternatives as described below. Differences in ecological resources impacts between alternatives are described in Sections 4.4.2.1 through 4.4.2.4.

Direct Impacts to Ecological Resources

Each of the Build Alternatives has a maximum ROW width of 250 feet and would fragment existing ecosystems intersecting the alignment. Ecosystem fragmentation creates a less biologically diverse edge condition and reduces the amount of interior space available for wildlife. Forested land (including forested wetlands, pine plantations, and bottomland hardwood forests) would be replaced with grassy or shrub-dominated habitat along the roadway in the ROW and become simplified habitat occupied by grassland species and less-habitat-specific species. Structural diversity of higher elevation habitats would be removed, reducing species diversity, especially birds, in the ROW and along the edges of forested habitat (USEPA 1994).

Short-term direct localized adverse impacts to ecological resources could be expected during project construction. Erosion from construction activities could generate increased levels of turbidity, suspended sediment, lower BOD5 and dissolved oxygen concentrations and slight increases in water temperature of receiving streams in the vicinity of the alternative alignment. Sediment from construction sites could be entrained in stormwater and drain from the site which would increase the turbidity and level of suspended sediments as stormwater runoff drains to receiving streams. With increased turbidity and suspended organic and inorganic sediments, BOD5 could increase and dissolved oxygen levels could decrease from bacteria consuming organic sediments. Increases in suspended sediment could also increase sunlight reflection and generate heat, resulting in slight increases in temperature of receiving streams. Those impacts

1 would be temporary and localized during construction and would be reduced if exposed soils are
2 properly revegetated and erosion control devices are installed where appropriate. All
3 construction activities are required to obtain a Louisiana Pollutant Discharge Elimination System
4 (LPDES) General Permit for *Discharges of Storm Water from Construction Activities 5 Acres or*
5 *More* (General Permit for Construction Activities). Each permit application requires the submittal
6 and maintenance of a SWP3 which could reduce erosion on the construction site and minimize
7 the amount of sediment and potential pollution entering receiving streams.

8 **Land Cover.** Long-term direct major adverse impacts would be expected to occur to existing
9 land cover under the Build Alternatives. Long-term localized impacts from construction activities
10 would be expected and would include removal of trees, shrubs, and structures accompanied by
11 leveling operations, altering the original topography and soil structure. Staging areas would be
12 within the proposed ROW during construction. If the project is fully funded, it is estimated that
13 the construction duration would be approximately four years. However, funding limitations may
14 require the project to be segmented for up to six construction projects, which could extend the
15 construction of the project to a 12-year period.

16 Long-term direct major adverse impacts would result in loss of habitat and conversion to
17 impervious cover, while a simplified grassland habitat would replace the existing land cover
18 within the limits of construction. Although some native vegetation may be preserved within the
19 limits of construction, the original natural characteristics would be removed within the roadway
20 alignment and disturbed along adjacent roadsides and ditches. LADOTD-approved grasses and
21 wildflowers would be established and trees could be planted in the ROW and median if they meet
22 LADOTD specifications for visibility and safety. Seed mixtures approved by LADOTD include
23 the following species: hulled Bermuda (*Cynodon spp*), unhulled Bermuda, crimson clover
24 (*Trifolium incarnatum L.*), Kentucky 31 fescue (*Festuca arundinacea*), Pensacola bahia
25 (*Paspalum notatum*) vetch (*Visia sp.*), and annual rye (*Lolium multiflorum*).

26 **Wildlife.** Short-term localized direct adverse impacts would be expected to wildlife before and
27 during roadway construction. Wildlife inhabiting this area prior to construction include white-
28 tailed deer, red fox, feral pig, gray squirrel, fox squirrel, eastern cottontail rabbit, swamp rabbit,
29 opossum, raccoon, muskrat, and smaller rodents such as moles, shrews, skunks, and weasels.
30 Clearing the ROW would cause localized and temporary dispersal impacts, but wildlife would be
31 expected to return to adjacent areas after construction is complete and the area is revegetated.

32 Short-term localized direct minor adverse impacts to aquatic life could be expected during
33 construction of the Build Alternatives. Roadway construction would leave large areas of earth
34 unprotected and sloping work could increase the potential for erosion of the surface material
35 during storm events. Roadside ditches would be constructed in non-wetland areas and these
36 ditches could carry eroded material from the construction site down-slope entering downstream
37 wetlands or waterways where sediment would be deposited. Turbid water interferes with
38 respiration and filter-feeding behavior of macroinvertebrates as well as reduces fish feeding
39 success due to visual impairment. Turbidity also decreases photosynthesis for primary producers.
40 Sediment deposition fills pools and interstitial spaces in the stream bottom, choking out aquatic
41 vegetation and reduces survival rates for macroinvertebrates and juvenile fishes. Turbidity
42 resulting from sediment could reduce light penetration for submerged aquatic vegetation critical
43 to stream health and could increase stream temperatures through energy generated from light
44 reflected off suspended sediments. Sediment could physically alter habitat by destroying the
45 riffle-pool structure in stream systems, and smothering benthic organisms such as clams and
46 mussels. Finally, sediment transports many other pollutants that could affect aquatic organisms in
47 receiving streams. Increased nutrients and hydrocarbons in the receiving streams could create

1 algal blooms that deplete oxygen from the water to low levels which could become toxic to
2 aquatic life (CEMVN 2008). BMPs would be employed to minimize sediment from entering
3 receiving streams.

4 Long-term direct adverse impacts, ranging from moderate to major, to aquatic species could
5 occur under the Build Alternatives. Increased stormwater drainage efficiency from roadsides via
6 ditches could affect surrounding wetlands, reducing the length of time surface water would be
7 stored. Aquatic species found in those seasonally flooded systems have adapted life cycles that
8 allow successful breeding and rearing of young to adulthood in normal rainfall years. If the
9 inundation depth and duration is shortened, aquatic species may not be able to complete life
10 cycles in adjacent wetlands and flatwoods.

11 Additional short-term direct minor adverse impacts could be expected from noise and lights from
12 construction activities and use of this alternative alignment. Light and noise could affect
13 migration, breeding, and nesting of wildlife in the vicinity of the roadway (CEMVN 2008).

14 Short-term direct minor adverse impacts to wildlife species during project construction could
15 include temporary disturbances to nesting and annual migration patterns of birds passing over or
16 stopping in St. Tammany Parish en route to Lake Pontchartrain. The project area is in the
17 Mississippi flyway and the eastern portion of Louisiana is one of the principal routes for
18 migratory birds (Birdnature 2001). Migratory birds rely on wetlands in St. Tammany for foraging,
19 breeding, and nesting habitat including northern pintail, green-winged teal, canvasback, ring-
20 necked, greater and lesser scaup, bufflehead northern cormorant, common loon, pied-billed grebe,
21 and horned grebe (CWP 2006). Land clearing and noise during construction could disrupt bird
22 stopovers, but those impacts would be temporary and localized during construction.

23 **Threatened and Endangered Species and Habitats.** No direct impacts to any T&E species
24 would be expected under the Build Alternatives. Field surveys were conducted for these species
25 identified as potentially occurring in the project area: red-cockaded woodpecker, Louisiana
26 quillwort, gopher tortoise, and ringed map turtle.

27 During field surveys of the proposed alternative alignments in March, April, May, and September
28 2010, red-cockaded woodpeckers and cavity trees were not observed within or in the vicinity of
29 the 250-ft ROW.

30 No quillwort was observed during any field surveys and critical habitat was not identified in the
31 250-ft ROW of any alternative but appropriate habitat exists in the project area.

32 The sandy soils and herbaceous understory of the upland longleaf pine forests are known as
33 suitable habitat for the gopher tortoise. Gopher tortoise and burrows were not observed during
34 any of the field surveys. No critical habitat has been identified for gopher tortoise in the 250-ft
35 ROW of the alignments but appropriate habitat exists in the project area. In 2001, the EPA
36 Endangered Species Protection Program identified two locations of potential gopher tortoise
37 critical habitat. Detailed surveys of those areas were performed in February 2011 but did not
38 identify critical habitat or observe gopher tortoise or burrows.

39 Ringed map turtle was not observed during any of the field surveys. No critical habitat has been
40 identified for the ringed map turtle in the 250-ft ROW of any alternative. The nearest identified
41 habitat is in the vicinity of the Bogue Chitto River, outside of the project area (NatureServe
42 2009).

43 Bachman's sparrow, a candidate for T&E listing, is a resident of pine woodlands and prefers open
44 pine woods in transition to forest. Clearing of timber areas could displace this songbird to other
45 remaining pine woodlands (National Audubon Society 2010a). Henslow's sparrow is a winter

1 migratory species that could be impacted by the Build Alternatives through fragmentation of pine
2 savanna habitat and loss of pitcher plant bogs. This species prefers those types of habitats along
3 the southeastern coastal states and fragmentation or loss of those habitats would reduce winter
4 habitat (National Audubon Society 2010b).

5 **Sensitive Terrestrial and Aquatic Habitats.** Long-term direct major adverse impacts to
6 sensitive natural communities would be expected under the Build Alternatives. Pine flatwoods
7 and savannas are sensitive habitats that may be impacted under the Build Alternatives. Those
8 areas provide habitat for several species being considered for listing as threatened or endangered,
9 including Bachman's sparrow, diamondback rattlesnake, flatwoods salamander, gopher frog, pine
10 snake, and southern hognose snake. Less mobile birds, amphibians, and reptiles inhabiting the
11 areas where staging or construction would occur could be displaced or killed if this alternative
12 was implemented. Pine flatwoods are also known for their richness in vegetation diversity with
13 orchids, insectivorous plants, and other vegetation endemic only to this habitat. Loss of this
14 habitat could subsequently result in the loss of rare plants including parrot pitcher plant
15 (*Sarracenia psittancina*) and spreading pogonai (*Cleistis bifaria*) found only in pine flatwoods
16 and savannas.

17 Other sensitive terrestrial and aquatic habitats include the five mitigation banks in the project
18 area: Dolly-T, Talisheek Pine Wetlands, Abita Creek Flatwoods, Bayou Lacombe and Mossy
19 Hill. Impacts to each mitigation bank vary depending on the location of the alignment to the
20 mitigation bank.

21 **Wetlands.** Long-term direct major adverse impacts to wetlands would be expected under the
22 Build Alternatives. Wetlands in the proposed 250-ft ROW of each alternative alignment would
23 be permanently lost to construction, clearing, and filling activities. Portions of wetlands would be
24 converted to impervious roadway and grassy ROW. Appendix I provides detailed figures
25 illustrating the wetland types directly impacted by the Build Alternatives.

26 ***Indirect Impacts to Ecological Resources***

27 Long-term indirect minor adverse impacts to ecological resources could be expected post-
28 construction from routine vehicle traffic, roadway maintenance, and vehicle accidents and spills.
29 Routine maintenance activities such as roadway paving and patching; roadside blading and litter
30 collection; vegetation management; cleaning, painting, and repair of roadside structures; street
31 cleaning; equipment cleaning and hazardous material handling and storage could lead to
32 degradation of water quality, including increased suspended solids, temperature, and
33 concentrations of heavy metals, nutrients, pesticides, and hydrocarbons from roadside runoff and
34 alterations in hydrology from road construction (USEPA 1994).

35 Suspended solids in stormwater increase turbidity and transport other pollutants adsorbed to
36 sediment and long-term accumulation of sediment reduces storage capacities of ponds, lakes, and
37 wetlands. Heavy metals are toxic to many aquatic organisms and bioaccumulate in tissues which
38 could pose human health risks to humans. Introducing increased levels of nutrients into a nutrient
39 poor habitat could result in a vegetative shift. Rapid increases in those populations deplete
40 oxygen levels to the extent that fish and other aerobic organisms die off. Bioaccumulation of
41 pesticides in fish and sediment may kill off aquatic organisms after long periods or pose human
42 health risks. PAHs include compounds found in petroleum products that are known to be
43 carcinogenic. Those compounds pose human health risks if drinking water sources or fish become
44 contaminated with them. PAHs in streams and lakes adhere to sediment and bioaccumulate in
45 stream bottoms which could impact benthic organisms and bottom feeders (CEMVN 2008).

1 Long-term indirect adverse impacts to natural hydrology, fire regimes, animal migration patterns,
2 and competitor and predator-prey relationships could occur under this alternative (USEPA 1994).
3 Natural linkages formed by riverine habitat would be impacted, affecting natural hydrology and
4 reducing the ability of wildlife to move from one area to another (CEMVN 2008). Habitats for
5 several bird species require prescribed burns to maintain suitable habitat including Northern
6 Bobwhite quail, American woodcock, Bachman's sparrow, and Henslow's sparrow (LDWF 2008,
7 National Audubon Society 2010a, 2010b, Olinde 2010). Safety issues associated with highway
8 operations could preclude fire management activities near the roadway and in most cases would
9 limit it in the general vicinity except during favorable wind conditions (CEMVN 2008).

10 Invasive species including Chinese tallow (*Triadica sebifera*), cogon grass (*Imperata cylindrical*),
11 and kudzu (*Pueraria montana*) could spread in disturbed areas along the roadway. Chinese tallow
12 is a prolific invasive tree prevalent along disturbed forest edges and swamps. Cogon grass is
13 known to occur in St. Tammany and Washington Parishes and prefers disturbed uncultivated
14 areas with sandy soils and low nutrients, especially areas along highways and is known to be
15 spread by mowing equipment that has not been washed and treated. Cogon grass will also
16 outcompete native vegetation and becomes very difficult to control once established. Kudzu is an
17 aggressive exotic vine occurring throughout the area that is known to rapidly overtake large
18 swaths of existing vegetation, reducing the native plant's ability to absorb sunlight for
19 photosynthesis, which eventually kills the plant (Tulane/Xavier 2010). Other invasive species
20 observed in the region during field surveys include Japanese climbing fern (*Lygodium*
21 *japonicum*), tungoil tree (*Aleurites fordii*), and privet (*Ligustrum spp.*).

22 Red imported fire ants (*Solenopsis invicta*) were accidentally introduced to Mobile, Alabama in
23 1933 and have spread throughout the southern United States. Fire ant infestations could spread in
24 the project area through fill, mulch, gravel, or sod brought in from outside the project area that
25 contain fire ant mounds or on vehicles traveling along the highway (Tulane/Xavier 2010).

26 The southern pine beetle (*Dendroctonus frontalis* Zimmerman) is a destructive insect throughout
27 the Southern United States, Mexico, and Central America and affects all pines but primarily
28 impacts loblolly and shortleaf pine trees. Infestations occur in stands where trees have been
29 crowded and vigor is low. Pine stands weakened by drought, flooding, and logging are more
30 susceptible to infestations and if beetle populations are large enough, they could spread from the
31 weakened stands and infest and overtake healthy trees. Road construction could weaken pine
32 trees through soil compaction and erosion and could make trees susceptible to beetle infestation.
33 To minimize outbreaks, roadways should be constructed to minimize erosion, flooding, and
34 changes in the water table (USDA 1997).

35 **Land Cover.** Long-term indirect moderate adverse impacts could be expected to land cover.
36 Highway development could indirectly induce secondary development along the alignment or at
37 intersections with other roadways which could destroy, fragment, and degrade existing
38 ecosystems in a similar manner. New developments could require clearing of vegetation which
39 could remove or fragment existing habitats and construction could degrade surrounding
40 ecosystems through increased sediment loading of receiving streams. After construction is
41 complete, water quality would be expected to return to preconstruction conditions.

42 **Wildlife.** Long-term indirect minor adverse impacts could be expected from the fragmentation of
43 habitat under the Build Alternatives, including mortality of native species, physiological stress
44 and decreased reproduction, disruption of normal behavior and activities, segmentation of
45 interbreeding populations, modified species interactions, and invasion of exotic species (USEPA
46 1994). Increased light penetration and wind into forests alter the microclimate and could impact
47 species diversity and density along the forested edge. Natural animal migration patterns and the

1 relationships among competitors and between predators and prey are an essential part of
2 ecosystem integrity. Some predator species would benefit with the introduction of new prey
3 species, but less adaptable species would be adversely affected by the presence of new
4 competitors or predators.

5 Long-term indirect major adverse impacts could be expected under the Build Alternatives. The
6 roadway would introduce a physiological barrier between contiguous pine habitat and wetlands,
7 which could inhibit wildlife migration across the roadway and breeding and nesting in the vicinity
8 of the roadway. Wildlife mortality as a result of collisions with vehicles could increase as wildlife
9 cross the roadway.

10 **Threatened and Endangered Species and Habitats.** Indirect impacts are alignment specific and
11 described in Sections 4.4.2.1 through 4.4.2.4.

12 **Wetlands.** Long-term moderate indirect adverse impacts could be expected under the Build
13 Alternatives. Changes to hydrology could reduce the ability of wetlands to provide existing
14 functions and services. Impacts to wetland hydrology could degrade water quality, constrict
15 flows, increase flooding, increase peak flows, increase water level fluctuations, and reduce water
16 storage capacity.

17 Wetland functions and services and the types of plants and animals that inhabit it are largely
18 determined by hydrology (CWP 2006). Wetland functions include water storage, transformation
19 of nutrients, growth of living matter, and wildlife habitat. Construction of the alignment could
20 impede channel and overland flow resulting in oversaturated and ponded areas in adjacent
21 wetlands. Since majority of the project area has little to no slope, water tends to move via
22 overland flow. Culverts allow surface flows to move under the roadway, however, over time
23 culverts are the most common cause of flow constriction because of long-term loss in hydraulic
24 capacity from sedimentation and increased peak flows (CWP 2006).

25 Stormwater runoff from impervious road surfaces and compacted soils could degrade water
26 quality by increasing sediment deposition and pollutant accumulation in adjacent wetlands.
27 Increased sedimentation could reduce light availability, temperature, and oxygen levels in the soil
28 needed for seedling germination. Over time, increased pollutant and nutrient concentrations could
29 reduce the ability of a wetland to break down nutrients and other pollutants in the soil causing the
30 wetland to become a source of contamination.

31 Higher peak flows and improved drainage could result in a wider fluctuation of water levels in
32 adjacent wetlands. Those fluctuations would return to baseline conditions more quickly than in an
33 undeveloped wetland area (CWP 2006). When the seasonal water level fluctuation is altered in a
34 wetland, mortality of existing plant communities could occur in response to the new hydroperiod
35 and change the wetland type.

36 Reduced storage capacity from wetland loss could increase the frequency and magnitude of
37 stormwater runoff and the increased volume of water carried by area streams could result in flows
38 beyond the *critical erosive velocity*. The increased energy resulting from more frequent bank full
39 flow events could result in erosion, enlargement of the stream channel, and consequent habitat
40 degradation. Reduced surface water storage capacity of wetlands could not only increase the rate
41 of stormwater runoff during storm events, but also reduce available, near surface groundwater
42 which is important in maintaining base stream flow during drier periods. The decline in the
43 physical habitat of the stream, coupled with lower base flows and higher stormwater pollutant
44 loads, could also have a severe impact on the aquatic community.

To quantify the indirect impacts to wetlands outside of the Build Alternatives ROW, models were run to evaluate the impact on inundation (ponding), hydrologic drought, and water level fluctuations. Ponding was defined as areas inundated for three consecutive days with a water depth greater than one inch. Hydrologic drought events are defined as wetland areas that remain dry for three consecutive days. Water level fluctuations are defined as the difference in maximum and minimum water levels in a wetland for a given period of time and are used to quantify a wetland's hydroperiod. For modeling purposes, analysis was performed for the 2, 25, and 100-year storm events, and a change in water level was noted only if it exceeded one inch. Results of the model analysis show that ponding duration is not a critical factor in terms of identifying the acreage of wetland impacted. In addition, no significant drought would be caused by construction of any of the alternatives.

4.4.2.1 Alternative B/O

Direct Impacts to Ecological Resources

Land Cover. Long-term significant direct adverse impacts to land cover would occur under Alternative B/O. Approximately 513 acres of existing land cover would be replaced with impervious road surfaces and a simplified habitat of grasses and herbaceous material in the 250-ft ROW. Table 4-19 lists land cover directly impacted in the 250-ft ROW for Alternative B/O.

Table 4-19.
Alternative B/O land cover converted to highway

Land Use	Area (acres)
Cultivated Crops	1.45
Emergent Herbaceous Wetlands	1.66
Evergreen Forest	260.67
Grassland/Herbaceous	14.96
Mixed Forest	0.87
Open Water	1.42
Pasture/Hay	10.60
Shrub/Scrub	151.93
Forested Wetlands	69.71

Source: U.S. Department of Interior 2007

Wildlife. No additional impacts to wildlife would be expected beyond the direct impacts listed in Section 4.4.2.

Threatened and Endangered Species and Habitats. No direct impacts to potential red-cockaded woodpecker habitat would be expected under this alternative. During field surveys of the proposed alternative alignments in March, April, May, and September 2010, red-cockaded woodpeckers and cavity trees were not observed within the 250-ft ROW, or vicinity of, Alternative B/O. Potential suitable habitat was observed in the vicinity of the ROW along Alternative B/O, but additional detailed surveys performed in February 2011 did not identify locations along Alternative B/O that would support suitable foraging or nesting habitat. Appendix C provides details of the survey in the Threatened and Endangered Species Report.

No direct impacts to the Louisiana quillwort would be expected. Three locations for the Louisiana quillwort have been mapped along the northern portion of LA 21 where LA 21 would

1 be widened as part of the new alignment; however no quillwort was observed during any field
2 surveys.

3 **Sensitive Terrestrial and Aquatic Habitats.** Long-term direct major adverse impacts to
4 sensitive natural communities would be expected under Alternative B/O. Approximately 225
5 acres of pine flatwoods habitat within the 250-ft ROW would be permanently lost and converted
6 to impervious cover and simplified grassland habitat.

7 Approximately 30 acres of upland longleaf pine habitat within the 250-ft ROW would be lost and
8 converted to roadway and simplified grassland habitat. The 30 acres is part of a 372-acre upland
9 longleaf pine area which would be bisected by the alignment. Upland longleaf pine habitat is
10 approximately 2.5 miles south of LA 21 where Alternative B/O turns southward. This longleaf
11 pine habitat is currently in a degraded state with dense woody understory but mechanical and
12 chemical controls to remove the underbrush and prescribed burns could restore the functions of
13 the community (LDWF 2010).

14 **Wetlands.** Long-term direct major adverse impacts to wetlands would be expected under
15 Alternative B/O. Approximately 384 acres of wetlands in the proposed 250-ft ROW would be
16 permanently lost to construction, clearing, and filling activities. The wetland types directly
17 impacted are listed in Table 4-20. Detailed figures illustrating the wetland types directly impacted
18 by Alternative B/O are provided in Appendix I.

19 **Table 4-20.**
20 **Direct wetland impacts for alternative B/O**

Wetland Type	Area (acres)
Pine flatwoods (less intensively managed)	194.0
Pine savanna (or areas in early succession)	91.0
Bayhead or hardwood flats along stream channels	50.4
Slash pine/pond cypress flats	30.2
Degraded primary and secondary habitats	18.4

21
22
23 ***Indirect Impacts to Ecological Resources***

24 **Land Cover.** No additional impacts to land cover would be expected beyond the indirect impacts
25 listed in Section 4.4.2.

26 **Wildlife.** No additional impacts to wildlife would be expected beyond the indirect impacts listed
27 in Section 4.4.2.

28 **Threatened and Endangered Species and Habitats.** Long-term indirect negligible impacts to
29 habitat for the Louisiana quillwort could occur by the widening of LA 21 under this alternative.
30 Widening of LA 21 near the mapped locations for Louisiana quillwort may alter hydrology and
31 water quality and adversely impact native habitat through higher and lower flows and increased
32 turbidity, temperature, and sedimentation of wetlands and receiving streams.

33 **Sensitive Terrestrial and Aquatic Habitats.** No additional impacts to sensitive terrestrial and
34 aquatic habitats would be expected beyond the indirect impacts listed in Section 4.4.2.

35 **Wetlands.** To minimize flow constrictions, 23 major culverts, 67 equalizer culverts, and 7
36 bridges are proposed over the 30 waterways crossed by this alternative (see Section 4.3). Since
37 majority of the project area has little to no slope, water tends to move via overland flow.

1 Modeling indicates Abita Creek and the associated wetlands north of LA 435 could experience
2 the greatest amount of flow constriction and water impounding under this alternative.

3 Table 4-21 provides a summary of the model results for indirect wetland impacts for Alternative
4 B/O. Section 4.3 provides further detail regarding the direct and indirect impacts to water
5 resources, and hydrology and hydraulics.

6 **Table 4-21. Alternative B/O indirect wetland impacts**

Indirect Wetland Impact	Acres Impacted
Pine flatwoods (less intensively managed)	407.9
Pine savanna (or areas in early succession)	143.2
Bayhead or hardwood flats along stream channels	44.8
Slash pine/pond cypress flats	44.5
Degraded primary and secondary habitats	1.9

7
8 **4.4.2.2 Alternative J**

9 ***Direct Impacts to Ecological Resources***

10 **Land Cover.** Long-term significant direct adverse impacts to land cover would occur under
11 Alternative J. Impervious surfaces and grasses and herbaceous material in the 250 foot ROW
12 would replace approximately 573 acres of existing land cover on the proposed alignment. Table
13 4-22 lists the land cover permanently lost and converted to roadway under this alternative.

14 **Table 4-22.**
15 **Alternative J land cover converted to highway**

Land Use	Area (acres)
Cultivated Crops	8.07
Emergent Herbaceous Wetlands	0.41
Evergreen Forest	178.06
Grassland/Herbaceous	22.83
Mixed Forest	0.92
Open Water	0.08
Pasture/Hay	13.51
Shrub/Scrub	272.86
Forested Wetlands	76.30

16 Source: U.S. Department of Interior 2007
17
18

19 **Wildlife.** No additional impacts to wildlife would be expected beyond the direct impacts listed in
20 Section 4.4.2.

21 **Threatened and Endangered Species and Habitats.** No direct impacts to potential red-
22 cockaded woodpecker habitat would be expected under this alternative. Suitable foraging or
23 nesting habitat was not observed during surveys along Alternative J; however, a goal of
24 mitigation banks in the project area is to restore suitable habitat for this species, which could be
25 negatively affected by the loss of bank lands and the inability to properly manage these banks.

1 Suitable gopher tortoise habitat has been mapped and identified along the northern section of the
 2 alignment east of and adjacent to the abandoned Gulf Mobile and Ohio Railroad. Gopher tortoise
 3 and burrows were not observed during any of the field surveys. No designated critical habitat has
 4 been identified for gopher tortoise in or in the vicinity of the Alternative J 250-ft ROW. In 2001,
 5 the EPA Endangered Species Protection Program identified two locations of potential gopher
 6 tortoise critical habitat, which are outside of the 250 foot ROW (USEPA 2001). Appendix C
 7 provides details of February 2011 surveys of those two areas, which did not identify critical
 8 habitat, gopher tortoise, or burrows.

9 **Sensitive Terrestrial and Aquatic Habitats.** Long-term direct major adverse impacts to
 10 sensitive natural communities would be expected under Alternative J. Alternative J would
 11 directly impact two mitigation banks in the project area. Direct long-term major adverse impacts
 12 would be expected to Mossy Hill Mitigation Bank (Figure 4-12) and Dolly-T Mitigation Bank
 13 (Figure 4-13). At Mossy Hill Mitigation Bank, approximately 35 acres of wet pine savanna would
 14 be removed and fragment the bank into one large 2,073 acre parcel and two smaller parcels, one
 15 approximately 108 acres and the other 536 acres. Alternative J would also impact the Dolly-T
 16 Mitigation Bank. The bank consists of 1,624 acres of pine wetland habitat. Approximately 25
 17 acres of the mitigation bank would be lost and converted to highway and ditches in the 250-foot
 18 ROW. Additionally, the road would fragment an additional 10 acres from the main parcel,
 19 reducing the bank to approximately 1,589 acres. The fragmentation of this mitigation bank could
 20 lead to land management issues, as management of those areas close to the roadway may be
 21 limited when prescribed burning for habitat improvement occurs. Smoke from the prescribed
 22 burns could impact the visibility and safety of vehicles traversing the roadway and limit how
 23 these areas of the mitigation bank can be managed. The loss of wet pine savanna habitat could
 24 also impact restoration activities planned for the gopher tortoise and overall restoration efforts to
 25 re-establish habitat for red cockaded woodpecker, Bachman's sparrow, mud salamander, pitcher
 26 plants, pine woods lily, and bog flame flower (EIP 2010).

27 **Wetlands.** Long-term direct major adverse impacts to wetlands would be expected with this
 28 alternative. Approximately 373 acres of wetlands in the proposed 250-ft ROW would be
 29 permanently lost to construction, clearing, and filling activities. The wetland types directly
 30 impacted are listed in Table 4-23. Detailed figures illustrating the wetland types directly impacted
 31 by Alternative J are provided in Appendix I.

32 **Table 4-23.**
 33 **Direct wetland impacts for Alternative J**

Wetland Type	Area (acres)
Pine flatwoods (less intensively managed)	16.7
Pine flatwoods (intensively managed)	223.7
Pine savanna (or areas in early succession)	94.2
Bayhead or hardwood flats along stream channels	13.8
Slash pine/pond cypress flats	20.5
Degraded primary and secondary habitats	3.7

34
 35
 36 In the northern portion of the alignment, approximately 2,000 feet south of the intersection LA 40
 37 in Bush, Louisiana, a section of Little Brushy Branch is proposed to be channelized along the
 38 road for approximately 2,465 linear feet. In this area, approximately 14 of the 373 acres of
 39 wetlands would be removed or disturbed by road construction and channel realignment.

Figure 4-12 Alt J+Q Direct Impacts to Mossy Hill Mitigation Bank

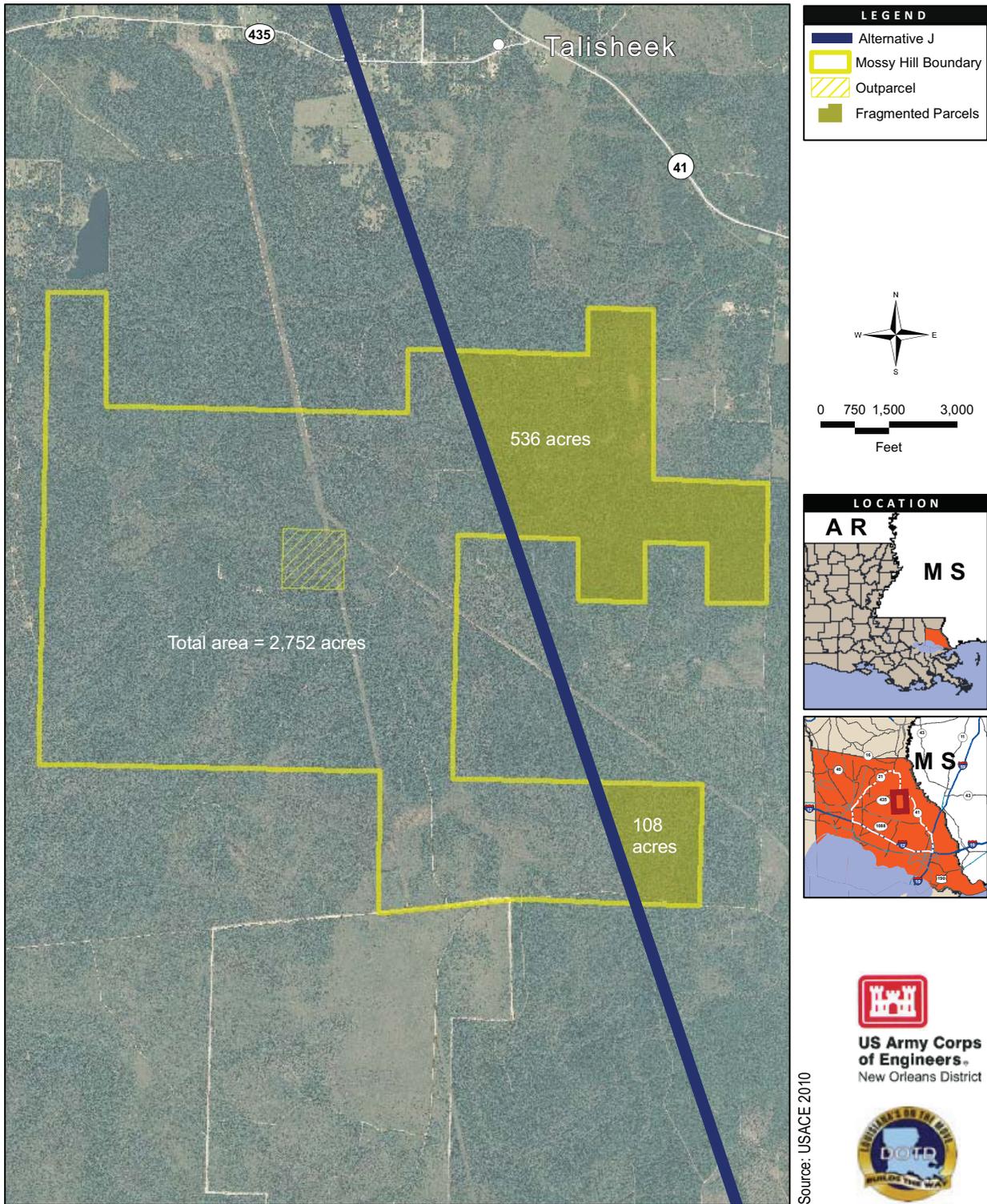
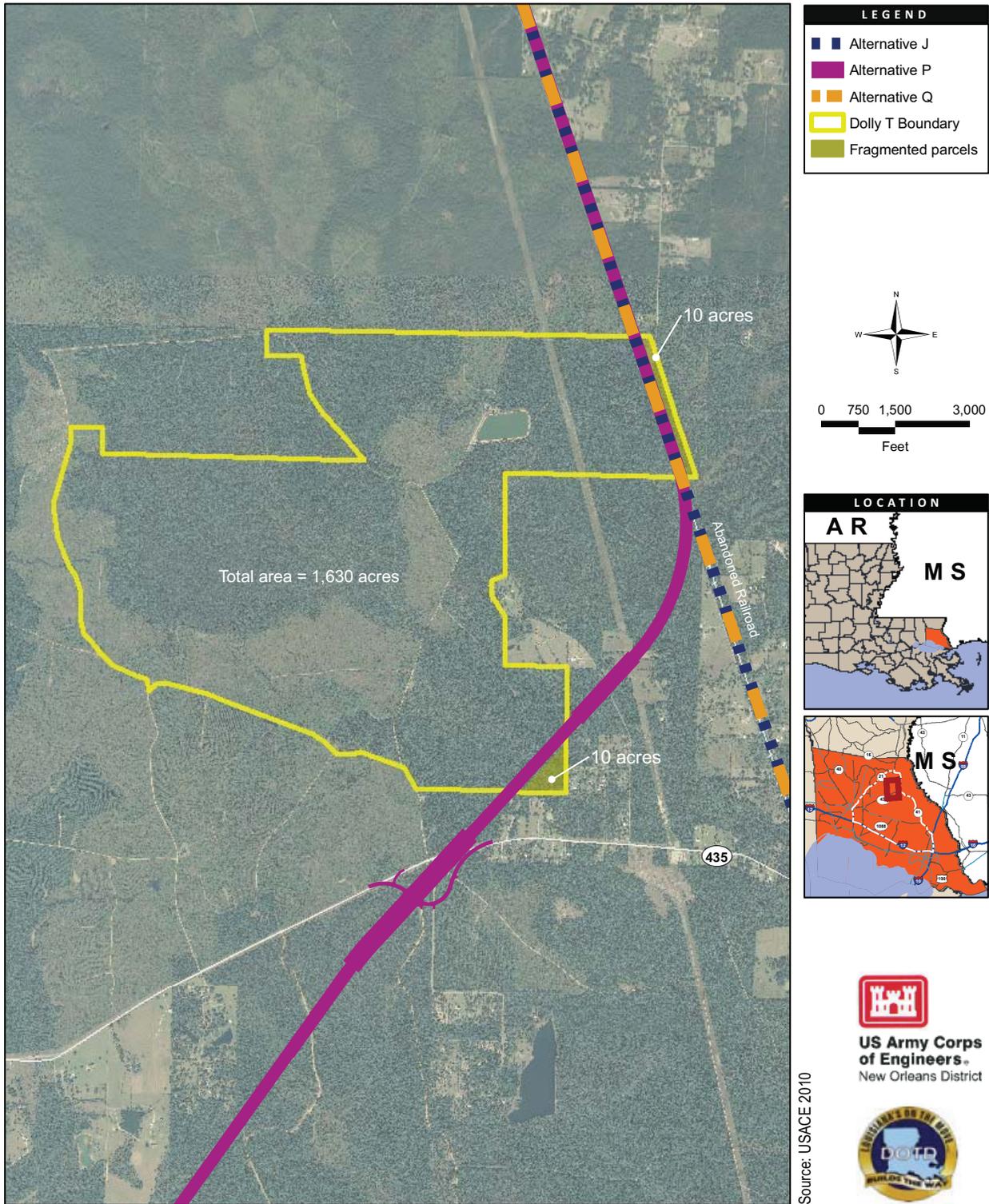


Figure 4-13 Alt J+P+Q Direct Impacts to Dolly T Mitigation Bank



Indirect Impacts to Ecological Resources

Land Cover. No additional impacts to land cover would be expected beyond the indirect impacts listed in Section 4.4.2.

Wildlife. No additional impacts to wildlife would be expected beyond the indirect impacts listed in Section 4.4.2.

Threatened and Endangered Species and Habitats. Fragmentation of the Mossy Hill and Dolly-T Mitigation Banks could impact the ability of the bank to restore habitat for the threatened gopher tortoise or the rare Bachman's sparrow, mud salamander, pitcher plants, pine woods lily, and bog flame flower.

Rehabilitation and management of red-cockaded woodpecker habitat relies on prescribed burning of pine forest communities which also directly benefits other pine woodland bird species such as Bachman's sparrow, brown-headed nuthatch, pine warbler, prairie warbler, and red-cockaded woodpeckers (USFWS 2003). Construction of this alternative could limit or preclude prescribed burns in wetland mitigation banks in the vicinity of the roadway. Smoke could reduce visibility along the roadway and burns could be restricted unless wind and weather conditions are favorable to minimize road hazards.

The management of habitat for red-cockaded woodpeckers could be indirectly impacted for Dolly-T Mitigation Bank and Talisheek Pine Wetlands Mitigation Bank. Both Dolly-T and Talisheek Pine Wetlands mitigation banks provide nesting and foraging habitat for the red-cockaded woodpecker and prescribed burns could be precluded with construction and operation of the proposed alignment. Impacts would be similar to those described in the paragraph above for pine forest communities.

Sensitive Terrestrial and Aquatic Habitats. Indirect impacts to mitigation banks, pine wetlands, flatwoods, and savannas could occur under this alternative. Disturbed hydrology in those habitats increases susceptibility of pine communities to invasive vegetation including Chinese tallow and cogon grass. Old-field weed species may germinate following disturbances which could reduce fire frequency and encourage hardwood growth.

Indirect impacts could also be expected to Talisheek Pine Wetlands, Mossy Hill Mitigation Bank, and Dolly-T Mitigation Bank under this alternative. Those mitigation banks are adjacent to and west of Alternative J in the northern section of the alignment. This alternative would be constructed over an existing abandoned railroad corridor which would have less indirect hydrological impacts to the surrounding ecosystems than a new alignment in an undisturbed area. However, enhancement activities, management, and maintenance of the mitigation bank may be impacted by affecting prescribed burn schedules for the area.

Additionally, safety issues associated with highway operations could prevent fire management activities near the roadway and generally limit any prescribed burns in the vicinity except under favorable wind conditions. Pine flatwood savanna mitigation 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 ability to conduct prescribed burns could reduce the credit potential of those banks.

Wetlands. In the northern portion of Alternative J, a section of Little Brushy Branch is proposed to be channelized along the alignment for approximately 2,465 linear feet. In this area, approximately 14 acres of wooded wetlands could be indirectly impacted by channelization. Channelization of a stream could result in draining adjacent wetlands through more efficient

1 drainage, which could increase stormwater flows downstream, reduce baseline flows, and alter
2 the existing wetland plant community.

3 To minimize flow constrictions along the alignment, 24 major culverts, 78 equalizer culverts, and
4 6 bridges are proposed by this alternative (see Section 4.3). Table 4-24 presents a summary of the
5 indirect wetland impacts for Alternative J, and Section 4.3 provides additional detail regarding
6 the direct and indirect impacts on water resources, as well as hydrology and hydraulics.

7 **Table 4-24.**
8 **Alternative J indirect wetland impacts**

Indirect Wetland Impact	Acres Impacted
Pine flatwoods (less intensively managed)	43.4
Pine flatwoods (intensively managed)	565.7
Pine savanna (or areas in early succession)	102.5
Bayhead or hardwood flats along stream channels	34.5
Slash pine/pond cypress flats	39.5
Degraded primary and secondary habitats	0.6

9
10 In addition, Alternative J would be expected to have long-term, major adverse indirect impacts to
11 the Talisheek Pine Wetlands Mitigation Bank, Dolly-T Mitigation Bank, and Mossy Hill
12 Mitigation Bank. The indirect impacts to these mitigation banks focus on two main issues – fire
13 and future management and reduced functionality of wetlands.

14 The primary tool to manage the pine flatwoods/savanna wetlands in the mitigation banks is
15 prescribed burning. This ecosystem requires prescribed burning nearly every year to be
16 effectively maintained and managed in accordance with the goals of the mitigation banks.
17 Currently strict guidelines are in place to conduct prescribed burns in a way to minimize smoke
18 impacts, particularly those areas near existing roadways, neighboring homes, businesses, and
19 communities. The construction of Alternative J would impact the fire management of these
20 mitigation banks due to smoke management related issues, and result in increased management
21 costs or reduced mitigation quality if areas cannot be burned as necessary. Changes in the
22 mitigation banks' fire management program would reduce the number of opportune burn days
23 and increase the use of herbicides and mechanical cutting to effectively control underbrush.

24 Functionality of the wetlands would be impacted as Alternative J would fragment the mitigation
25 bank. Fragmentation could reduce biodiversity of the ecosystem by impacting the hydrologic
26 regime, introducing highway noise, or introducing invasive non-native species, particularly cogon
27 grass. The impacts due to fragmentation could reduce the value of wetland credits in the
28 mitigation bank and increase the management costs of the system.

29 **4.4.2.3 Alternative P**

30 ***Direct Impacts to Ecological Resources***

31 **Land Cover.** Long-term significant adverse direct impacts would occur under Alternative P.
32 Approximately 507 acres of existing land cover would be permanently lost by conversion to
33 highway and associated ditches in the 250-ft ROW limit of construction. Table 4-25 lists the land
34 cover types that would be directly impacted under this alternative.

Table 4-25.
Alternative P land cover converted to highway

Land Use	Area (acres)
Cultivated Crops	6.20
Evergreen Forest	275.54
Grassland/Herbaceous	23.77
Mixed Forest	1.19
Pasture/Hay	32.75
Shrub/Scrub	102.57
Forested Wetlands	65.44

Source: U.S. Department of Interior 2007

Wildlife. No additional impacts to wildlife would be expected beyond the direct impacts listed in Section 4.4.2.

Threatened and Endangered Species and Habitats. Long-term direct minor adverse impacts to potential red-cockaded woodpecker habitat would be expected under this alternative. Potential suitable habitat was observed in the vicinity of the ROW in along two locations along Alternative P. Detailed surveys of potential suitable habitat were performed in February 2011. One location along the northern portion of Alternative P was observed to have suitable foraging habitat, but no suitable nesting habitat. The location along the southern portion of Alternative P was observed to have suitable nesting and foraging habitat, but no cavities formed by red-cockaded woodpeckers. Appendix C provides details of the surveys.

Sensitive Terrestrial and Aquatic Habitats. This alternative would cross the southwestern and western edges of the Dolly-T mitigation bank (Figure 4-13). The bank consists of 1,624 acres of pine wetland and associated community habitat. Approximately 35 acres of the mitigation bank would be lost and converted to highway and ditches in the 250-foot ROW. The mitigation bank would be fragmented into two 10-acre parcels, reducing the original size of the mitigation bank to 1,569 acres. The fragmentation of this mitigation bank could lead to land management issues, as those areas close to the roadway may be limited when prescribed burning for habitat improvement occurs. Smoke from the prescribed burns could impact the visibility and safety of vehicles traversing the roadway and limit how these areas of the mitigation bank can be managed.

Wetlands. Long-term direct major adverse impacts to wetlands would be expected under this alternative. Approximately 358 acres of wetlands in the proposed ROW would be permanently lost to construction, clearing, and filling activities. The wetland types directly impacted are listed in Table 4-26. Detailed figures illustrating the wetland types directly impacted by Alternative P are provided in Appendix I.

1 **Table 4-26.**
2 **Direct wetland impacts for Alternative P**

Wetland Type	Area (acres)
Pine flatwoods (less intensively managed)	164.7
Pine savanna (or areas in early succession)	73.6
Bayhead or hardwood flats along stream channels	11.7
Slash pine/pond cypress flats	101.6
Degraded primary and secondary habitats	6.3

3
4 ***Indirect Impacts to Ecological Resources***

5 **Land Cover.** No additional impacts to land cover would be expected beyond the indirect impacts
6 listed in Section 4.4.2.

7 **Wildlife.** No additional impacts to wildlife would be expected beyond the indirect impacts listed
8 in Section 4.4.2.

9 **Threatened and Endangered Species and Habitats.** Rehabilitation and management of red-
10 cockaded woodpecker habitat relies on prescribed burning of pine forest communities which also
11 directly benefits other pine woodland bird species such as Bachman's sparrow, brown-headed
12 nuthatch, pine warbler, prairie warbler, and red-headed woodpeckers (USFWS 2003).
13 Construction of this alternative could limit or preclude prescribed burns in wetland mitigation
14 banks in the vicinity of the roadway. Smoke could reduce visibility along the roadway and burns
15 could be restricted unless wind and weather conditions are favorable and minimize road hazards.

16 The management of habitat for red-cockaded woodpeckers could be indirectly impacted for
17 Dolly-T Mitigation Bank and Talisheek Pine Wetlands Mitigation Bank. Both Dolly-T and
18 Talisheek Pine Wetlands mitigation banks provide nesting and foraging habitat for the red-
19 cockaded woodpecker and prescribed burns could be precluded with construction and operation
20 of the proposed alignment. Impacts would be similar to those described in the paragraph above
21 for pine forest communities.

22 **Sensitive Terrestrial and Aquatic Habitats.** Dolly-T Mitigation Bank is a pine wetland
23 community that could be indirectly impacted under this alternative. The existing ecosystem
24 would be fragmented and would reduce the amount of available credits for the bank and could
25 hinder restoration efforts for the mitigation bank.

26 Indirect impacts could also be expected to Talisheek Pine Wetlands Under this alternative. This
27 mitigation bank is adjacent to and west of Alternative P and north and adjacent to Dolly-T
28 Mitigation Bank. This alternative would be constructed over an existing abandoned railroad
29 corridor which would have less indirect hydrological impacts to the surrounding ecosystems than
30 a new alignment in an undisturbed area. However, rehabilitation and maintenance of the
31 mitigation bank may be impacted by affecting prescribed burn schedules for the area.

32 **Wetlands.** The northern 4 miles of Alternative P overlap with the northern 4 miles of Alternative
33 J. Along the northern portion of Alternatives J and P, a section of Little Brushy Branch is
34 proposed to be channelized along the alignment for approximately 2,465 linear feet. In this area,
35 approximately 14 acres of wooded wetlands could be indirectly impacted by channelization.
36 Channelization of a stream could result in draining adjacent wetlands through more efficient
37 drainage which could increase stormwater flows downstream, reduce baseline flows, and alter the
38 existing wetland plant community.

To minimize flow constrictions through streams and wetlands, 23 major culverts, 54 equalizer culverts, and 7 bridges are proposed to cross 33 waterways by this alternative (see Section 4.3).

Table 4-27 provides a summary of the model results for indirect wetland impacts for Alternative P, and Section 4.3 provides further detail regarding the direct and indirect impacts on water resources, and hydrology and hydraulics.

Table 4-27.
Alternative P indirect wetland impacts

Indirect Wetland Impact	Acres Impacted
Pine flatwoods (less intensively managed)	230.6
Pine savanna (or areas in early succession)	89.9
Bayhead or hardwood flats along stream channels	21.1
Slash pine/pond cypress flats	150.1
Degraded primary and secondary habitats	17.1

Indirect impacts to the wetland mitigation banks in the project area would be similar to those described for Alternative J.

4.4.2.4 Alternative Q

Direct Impacts to Ecological Resources

Land Cover. Long-term significant direct adverse impacts would occur under Alternative Q. Approximately 530 acres of existing land cover types would be converted to highway and associated ditches in the 250-ft ROW limit of construction. Table 4-28 lists the land cover types that would be directly impacted.

Table 4-28.
Alternative Q land cover converted to highway

Land Use	Area (acres)
Cultivated Crops	7.53
Evergreen Forest	177.85
Grassland/Herbaceous	14.66
Mixed Forest	0.87
Pasture/Hay	11.47
Shrub/Scrub	265.04
Forested Wetlands	51.40
Emergent Herbaceous Wetlands	1.22

Source: U.S. Department of Interior 2007

Wildlife. No additional impacts to wildlife would be expected beyond the direct impacts listed in Section 4.4.2.

Threatened and Endangered Species and Habitats. No direct impacts on red-cockaded woodpeckers or their habitat would be expected under this alternative. In February 2011 detailed surveys of potential suitable habitat identified no locations along Alternatives Q to support suitable foraging or nesting habitat. The mitigation banks Dolly-T, Talisheek Pine Wetlands, and Mossy Hill, which are adjacent to Alignment Q, were established to restore suitable habitat for

1 this species. Loss of bank lands and the inability to properly manage these banks could negatively
2 affect this goal.

3 The northern 4 miles of Alternative Q overlap with the northern 4 miles of Alternative
4 Alignments J and P. Gopher tortoise and burrows were not observed during any of the field
5 surveys. No critical habitat has been identified for gopher tortoise in or in the vicinity of the
6 Alternative Q 250-ft ROW. In 2001, the EPA Endangered Species Protection Program identified
7 two locations of potential gopher tortoise critical habitat (USEPA 2001), which are outside the
8 ROW along the northern section of this alignment. In February 2011 detailed surveys of those
9 two areas did not identify critical habitat or observation of gopher tortoise or burrows.

10 **Sensitive Terrestrial and Aquatic Habitats.** Bayou Lacombe is designated as a Scenic River
11 and the alignment was designed to ensure Alternative Q did not cross or impact this sensitive
12 area.

13 Alternative Q would directly impact two mitigation banks in the project area. Direct long-term
14 major adverse impacts would be expected to Mossy Hill Mitigation Bank (Figure 4-12) and
15 Dolly-T Mitigation Bank (Figure 4-13). Approximately 35 acres of wet pine savanna in Mossy
16 Hill Mitigation bank would be removed by the road alignment and fragment the bank into one
17 large 2,073 acre parcel and two smaller parcels, one approximately 108 acres and the other 536
18 acres. Dolly-T mitigation bank would be fragmented on the western edge by the alignment,
19 removing 25 acres of wetlands for the ROW. The mitigation bank would be fragmented into a
20 10-acre parcel and reduce the original size of the bank to 1,589 acres. The fragmentation of those
21 mitigation banks could lead to land management issues, as management of those areas close to
22 the roadway may be limited when prescribed burning for habitat improvement occurs. Smoke
23 from the prescribed burns could impact the visibility and safety of vehicles traversing the
24 roadway and limit how these areas of the mitigation bank can be managed. The loss of wet pine
25 savanna habitat could also impact restoration activities planned for the gopher tortoise and overall
26 restoration efforts to re-establish habitat for red cockaded woodpecker, Bachman's sparrow, mud
27 salamander, pitcher plants, pine woods lily, and bog flame flower (EIP 2010).

28 **Wetlands.** Long-term direct major adverse impacts to wetlands would be expected under this
29 alternative. Approximately 305 acres of wetlands in the proposed ROW would be permanently
30 lost to construction, clearing, and filling activities. Portions of wetlands would be converted to
31 impervious roadway and grassy ROW. The wetland types directly impacted are listed in Table 4-
32 29. Detailed figures illustrating the wetland types directly impacted by Alternative Q are
33 provided in Appendix I.

34 **Table 4-29.**
35 **Direct wetland impacts for alternative Q**

Wetland Type	Area (acres)
Pine flatwoods (intensively managed)	198.5
Pine savanna (or areas in early succession)	68.3
Bayhead/hardwood flats along stream channels	7.8
Slash pine/pond cypress flats	30.2
Degraded primary and secondary habitats	0.3

36 ***Indirect Impacts to Ecological Resources***

37 Land Cover. No additional impacts to land cover would be expected beyond the indirect impacts
38 listed in Section 4.4.2.

1 Wildlife. No additional impacts to wildlife would be expected beyond the indirect impacts listed
2 in Section 4.4.2.

3 **Threatened and Endangered Species and Habitats.** Fragmentation of Mossy Hill Mitigation
4 Bank could impact the ability of the bank to restore habitat for the threatened gopher tortoise or
5 the rare Bachman's sparrow, mud salamander, pitcher plants, pine woods lily, and bog flame
6 flower. Rehabilitation and management of red-cockaded woodpecker habitat relies on prescribed
7 burning of pine forest communities which also directly benefits other pine woodland bird species
8 such as Bachman's sparrow, brown-headed nuthatch, pine warbler, prairie warbler, and red-
9 headed woodpeckers (USFWS 2003). This alternative could limit or preclude prescribed burns in
10 wetland mitigation banks in the vicinity of the roadway. Smoke could reduce visibility along the
11 roadway and burns would be restricted unless wind and weather conditions are favorable and
12 minimize road hazards.

13 The management of habitat for red-cockaded woodpeckers could be indirectly impacted for
14 Dolly-T Mitigation Bank and Talisheek Pine Wetlands Mitigation Bank. Both Dolly-T and
15 Talisheek Pine Wetlands mitigation banks provide nesting and foraging habitat for the red-
16 cockaded woodpecker and prescribed burns could be precluded with construction and operation
17 of the proposed alignment. Impacts would be similar to those described in the paragraph above
18 for pine forest communities.

19 Additionally, safety issues associated with highway operations could prevent fire management
20 activities near the roadway and generally limit any prescribed burns in the vicinity except under
21 favorable wind conditions. Pine savanna mitigation banks rely on fire management as the
22 principal tool to enhance and maintain bank lands and accrue credits to replace adverse impacts
23 associated with department of the Army permits. The loss of ability to conduct prescribed burns
24 could reduce the credit potential of those banks.

25 **Sensitive Terrestrial and Aquatic Habitats.** Indirect impacts could also be expected to
26 Talisheek Pine Wetlands, Mossy Hill Mitigation Bank, and Dolly-T Mitigation Bank under this
27 alternative. Those mitigation banks are adjacent to and west of Alternative Q in the northern
28 section of the alignment. This alternative would be constructed over an existing abandoned
29 railroad corridor which would have less indirect hydrological impacts to the surrounding
30 ecosystems than a new alignment in an undisturbed area. However, rehabilitation and
31 maintenance of the mitigation bank may be impacted by affecting prescribed burn schedules for
32 the area.

33 **Wetlands.** The northern 4 miles of Alternative Q overlap with the northern 4 miles of
34 Alternatives Alignment J and P. Along the northern portion of Alternative Q, a section of Little
35 Brush Branch is proposed to be channelized along this alignment for approximately 2,465 linear
36 feet. In this area, approximately 14 acres of wooded wetlands could be indirectly impacted by
37 channelization. Channelization of a stream could result in draining adjacent wetlands through
38 more efficient drainage which could increase stormwater flows downstream, reduce baseline
39 flows, and alter the existing wetland plant community.

40 To minimize flow constrictions in wetlands and streams, 22 major culverts, 71 equalizer culverts,
41 and 3 bridges are proposed to cross 25 channels by this alternative (see Section 4.3).

42 Table 4-30 provides a summary of the model results for the indirect wetland impacts for
43 Alternative Q, and Section 4.3 provides further detail regarding the direct and indirect impacts on
44 water resources, and hydrology and hydraulics.

Table 4-30.
Alternative Q indirect wetland impacts

Indirect Wetland Impact	Acres Impacted
Pine flatwoods (intensively managed)	414.2
Pine savanna (or areas in early succession)	63.1
Bayhead/hardwood flats along stream channels	10.1
Slash pine/pond cypress flats	89.2

Indirect impacts to the wetland mitigation banks in the project area would be similar to those described for Alternative J.

4.5 GEOLOGY AND SOILS

4.5.1 No Build Alternative

Under the No Build Alternative, construction of the proposed roadway from I-12 to Bush would not be undertaken. Consequently, there would be no direct or indirect impacts to geology and soils within the ROW, or vicinity of, any of the alternative alignment's corridors.

4.5.2 Build Alternatives

Direct and indirect impacts to geology and soils would be expected to be similar for each of the Build Alternatives as described below. Differences in geology and soil impacts between alternatives are described in Sections 4.5.2.1 through 4.5.2.4.

Direct Impacts to Geology and Soils

Long-term direct major adverse impacts would result from implementation of the Build Alternatives. Removal of surface material and placement of borrow material would directly impact soils in the project area during the construction of the new roadway. 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.

Short-term and long-term direct minor impacts could result from surface runoff associated with the construction of the roadway. Short-term direct impacts could occur from runoff of exposed soil during the construction phase. Construction of the proposed alternative would expose bare soil and could increase erosion along the alignment. Sediment could be entrained in stormwater and drain from the site, which could increase turbidity and level of suspended sediments as stormwater runoff drains to receiving streams. With increased turbidity and suspended organic and inorganic sediments, BOD5 could increase and dissolved oxygen levels could decrease from bacteria consuming organic sediments. Increases in suspended sediment could also increase sunlight reflection and generate heat, resulting in slight increases in temperature of receiving streams. Those impacts would be temporary and localized and would be expected to return to preconstruction levels after construction is complete and bare soils are revegetated. All construction activities are required to obtain an LPDES General Permit for Construction Activities. Each permit application requires the submittal and maintenance of a SWP3 which is intended to minimize erosion on the construction site and reduce the amount of sediment and potential pollution entering receiving streams.

1 The excavated material would be expected to consist mostly of sandy clay loam having a low
2 fertility and high levels of exchangeable aluminum. Because of limited gas exchange within
3 hydric soils, this material would be primarily anaerobic. Excavation of the drainage ditches and
4 adjacent wetlands substrate would result in modifications to the physical condition and chemical
5 composition of the existing soil profile. Removal of the upper soil layers would expose the
6 underlying clay substrata and because clay has binding and colloidal properties different from
7 organic particles, localized changes in soil chemistry would be expected to occur. Soil chemistry
8 would also be affected by the direct exposure of the anaerobic substrata to water and/or air. Most
9 substrate elements and compounds under anaerobic conditions exist in a chemically reduced state.
10 Interaction with the oxygenated environment would result in the conversion of soil chemicals to
11 an oxidized state, affecting pH, redox potential, and overall chemical nature of the existing
12 substrate (CEMVN 2008).

13 *Indirect Impacts to Geology and Soils*

14 Short-term and long-term moderate indirect impacts could result from the increased area of
15 impervious surfaces affecting runoff in the project area. Degradation of receiving streams can
16 typically be observed with less than 10 percent impervious coverage. Runoff from the roadway
17 and compacted soils could increase the concentration of sediment, turbidity, nutrients, and
18 temperature of receiving streams. Higher temperatures of impervious road surfaces could increase
19 the temperature of stormwater runoff and increased concentrations of suspended sediment could
20 absorb more sunlight energy and slightly increase temperatures in the receiving stream.

21 Highways are also a direct means of transport for pollution from leaking vehicle fluids, vehicle
22 wear and tear, and particulates from pavement breakdown. This could result in the increased
23 concentration of hydrocarbons (PAHs and oil and grease) and heavy metals (copper, lead, and
24 zinc) (CWP 2006) from emissions and wear and tear of vehicle parts including brake linings and
25 leaking fluids such as antifreeze (NHDES 2008, Woodward-Clyde 1994) in soils adjacent to the
26 ROW.

27 **4.5.2.1 Alternative B/O**

28 *Direct and Indirect Impacts to Geology and Soils*

29 Appendix J provides the Line and Grade Study for Alternative B/O, which estimates the removal
30 of 19,937 square yards of surface material and the installation of 2,525,719 cubic yards of borrow
31 material.

32 **4.5.2.2 Alternative J**

33 *Direct and Indirect Impacts to Geology and Soils*

34 Appendix J provides the Line and Grade Study for Alternative J, which estimates the removal of
35 26,333 square yards of surface material and the installation of 952,556 cubic yards of borrow
36 material.

37 **4.5.2.3 Alternative P**

38 *Direct and Indirect Impacts to Geology and Soils*

39 Appendix J provides the Line and Grade Study for Alternative P, which estimates the removal of
40 18,933 square yards of surface material and the installation of 2,129,061 cubic yards of borrow
41 material.

1 **4.5.2.4 Alternative Q**

2 ***Direct and Indirect Impacts to Geology and Soils***

3 Appendix J provides the Line and Grade Study for Alternative Q, which estimates the removal of
4 34,713 square yards of surface material and the installation of 1,885,625 cubic yards of borrow
5 material.

6 **4.6 AIR QUALITY**

7 **4.6.1 No Build Alternative**

8 Under the No Build Alternative, construction of the proposed roadway from I-12 to Bush would
9 not be undertaken. Consequently, there would be no direct or indirect impacts to air quality
10 within the ROW, or vicinity of, any of the alternative alignment's corridors.

11 **4.6.2 Build Alternatives**

12 Direct and indirect impacts to air quality would be expected to be similar for each of the Build
13 Alternatives as described below.

14 ***Direct and Indirect Impacts to Air Quality***

15 Short- and long-term minor adverse impacts to air quality would be expected from implementing
16 Alternative B/O. Short-term impacts would be primarily due to construction of the proposed
17 highway. Long-term impacts would be due to the increase in traffic in the study area and
18 rerouting of traffic to areas where previously there was none.

19 Construction would require the use of equipment that would emit small amounts of criteria
20 pollutants and greenhouse gases (GHG). In addition, there would be emissions from the use of
21 heavy trucks, fugitive particles from surface disturbance, and workers' commutes. The quantities
22 of pollutants emitted by construction activities would be small and would not contribute to
23 violations of any federal, state, or local air regulation. Air emissions from those activities would
24 be short lived and would cease upon the completion of the construction activities. All
25 construction would be accomplished in full compliance with the Louisiana Regulations for the
26 Control and Abatement of Air Pollution, particularly Title 33 Part III. Chapters of relevance are
27 as follows:

- 28 • Chapter 11, Control of Emissions of Smoke
- 29 • Chapter 13, Emission Standards for Particulate Matter
- 30 • Chapter 21, Control of Emissions of Organic Compounds

31 In addition BMPs during construction could be required. Those requirements could include:

- 32 • Reducing visible emissions and fugitive dust and emissions through watering
- 33 • Using BMPs during asphalt paving operations
- 34 • Limiting or restricting open burning activities
- 35 • Appropriate use of portable fuel containers
- 36 • Meeting new engine standards for non-road vehicles
- 37 • Using low VOC architectural, industrial, and maintenance coatings

4.7 NOISE

4.7.1 No Build Alternative

Under the No Build Alternative, construction of the proposed roadway from I-12 to Bush would not be undertaken. Long-term negligible adverse effects on the noise environment would be expected with the implementation of the No Build Alternative. The effects would primarily be due to the natural increase in traffic in the study area.

Noise levels were modeled for future traffic conditions with and without the proposed alternatives. Each roadway was modeled, assuming no special noise abatement measures would be incorporated, and the roadway sections were assumed at-grade. Future noise predictions are for the traffic conditions during 2035. It was assumed that the peak-hour volumes and corresponding speeds for trucks and automobiles would result in the noisiest conditions. Noise predictions of $L_{eq}(h)$ for representative receptors within one mile of each proposed alternative's right-of-way are outlined in Table 4-31. Notably, Table 4-31 outlines estimated noise from roadways in the area with the future levels of traffic, but without the proposed control of access highway. Under the No Build Alternative, there would be only a slight increase in the level of traffic noise for receptors within one mile of the proposed Control of Access highways. No residences or other land uses identified equal or exceed the NAC for category B of 66 dBA. No identified receptors would experience a greater than 10 dBA increase.

Table 4-31.
Sound levels - No Build Alternative (2035)

Right-of-Way Considered	Number of receptors within one mile of the proposed right-of-way		Existing $L_{eq}[1hr]$		No Build $L_{eq}[1hr]$		Number of Receptors Above 66 dBA
			A.M.	P.M.	A.M.	P.M.	
B/O	477	Maximum	33.7	33.7	34.5	34.9	0
		Minimum	28.8	28.5	30.0	30.1	
		Median	30.4	30.3	31.6	31.7	
J	94	Maximum	34.2	33.9	36.1	34.4	0
		Minimum	30.2	30.0	31.8	31.0	
		Median	31.4	31.1	33.1	31.8	
P	268	Maximum	56.8	56.7	56.7	56.9	0
		Minimum	30.0	29.9	31.4	31.0	
		Median	31.1	31.0	32.6	32.1	
Q	112	Maximum	56.6	56.6	56.6	56.7	0
		Minimum	30.2	30.0	31.8	31.0	
		Median	31.6	31.3	33.4	32.1	

4.7.2 Build Alternatives

Direct and indirect impacts to noise levels would be expected to be similar for each of the Build Alternatives as described below. Sections 4.7.2.1 through 4.7.2.4 describe differences in noise level impacts between alternatives.

1 **Direct Impacts to Noise Levels**

2 A noise study (Appendix D) evaluated impacts to noise sensitive sites along each alternative
3 alignment extend from Bush, Louisiana to I-12. All Build Alternatives would have short-term
4 minor and long-term significant adverse impacts to the noise environment. Short-term impacts
5 would be due to construction activities.

6 Regardless of alternative, a relatively small number of receptors (between 29 and 124) were
7 identified that would experience a greater than 10 dBA in noise during at least one peak traffic
8 period under future conditions. All receptors identified along the proposed highways are in low-
9 density areas and the distance between the proposed highway and the receptors is relatively large.
10 Regardless of which alternative was ultimately selected, noise barriers would be unreasonable, as
11 the bare minimum cost would be greater than \$25,000 per receptor.

12 Short-term direct impacts would occur from construction activities. As with any major
13 construction project, areas around the construction site are likely to experience varied periods and
14 degrees of noise. Individual pieces of construction equipment typically generate noise levels of 80
15 to 90 dBA at a distance of 50 feet (FHWA 2006). Table 4-32 presents typical noise levels (dBA
16 at 50 feet) that the EPA has estimated for the main phases of outdoor construction.

17
18 **Table 4-32.**
19 **Noise levels associated with outdoor construction**

Construction Phase	L_{eq} (dBA) at 50 feet from Source
Ground Clearing	84
Excavation, Grading	89
Foundations	78
Structural	85
Finishing	89

20 Source: USEPA 1974

21 With multiple pieces of equipment operating concurrently, noise levels can be relatively high
22 during daytime periods at locations within several hundred feet of active construction sites. The
23 zone of relatively high construction noise levels typically extends to distances of 400 to 800 feet
24 from the site of major construction operations. Locations within 800 feet would experience
25 appreciable levels of heavy equipment noise. Because construction activities would be confined
26 primarily to daytime hours, noise at nearby receptors may be clearly audible, but would not likely
27 be highly annoying.

28 Highway construction activities would cause temporary localized noise, and would normally be
29 conducted during daytime hours. At certain locations where traffic and/or road-use restrictions
30 would affect the schedule, those activities would proceed during evening hours. Equipment would
31 not be fixed in one location for long durations, but would progress along the ROW, and noise
32 would be temporary and subside at any particular location as the highway construction progresses
33 to subsequent segments. Those impacts would be temporary, and minor.

34 **Indirect Impacts to Noise Levels.** Noise levels were modeled for 2035 traffic conditions under
35 each of the Build Alternatives. Table 4-33 outlines noise predictions of $L_{eq}(h)$ for representative
36 receptors near roadways of interest in the study area.

**Table 4-33.
Sound levels for all alternatives**

Alternative	Number of Receptors ¹	Leq[1hr] [dBA]												Number of Receptors Above 66 dBA	Change from Existing Leq[1hr]		Number of Receptors Increase by Greater than 10 dBA
		Existing			No Build (2035)			With Alternative (2035)			A.M.	P.M.					
		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.								
B/O	477	Maximum	33.7	33.7	34.5	34.9	66.8	67.0	36.8	37.1	1	36.8	37.1	124			
		Minimum	28.8	28.5	30.0	30.1	33.1	33.5	3.3	3.4							
		Median	30.4	30.3	31.6	31.7	37.1	37.6	6.4	7.0							
J	94	Maximum	34.2	33.9	36.1	34.4	67.6	69.9	35.7	38.1	1	1.3	1.2	43			
		Minimum	30.2	30.0	31.8	31.0	35.5	35.1	7.0	9.4							
		Median	31.4	31.1	33.1	31.8	38.9	40.9	34.4	33.7							
P	268	Maximum	56.8	56.7	56.7	56.9	65.4	64.7	0.1	0.1	0	0.1	0.1	110			
		Minimum	30.0	29.9	31.4	31.0	36.1	35.6	9.1	8.8							
		Median	31.1	31.0	32.6	32.1	40.3	39.9	27.3	27.5							
Q	112	Maximum	56.6	56.6	56.6	56.7	58.2	58.2	-2.7	-2.7	0	-2.7	-2.7	29			
		Minimum	30.2	30.0	31.8	31.0	36.5	35.7	7.2	7.3							
		Median	31.6	31.3	33.4	32.1	40.1	39.9									

¹ Number of receptors within one mile of the proposed Control of Access highways

1 Long-term moderate adverse indirect impacts to the noise environment would be expected with
2 the implementation of the Build Alternatives. Long-term indirect impacts would be due to
3 changes in traffic noise throughout the study area. Those areas rural in nature currently do not
4 support high levels of through traffic; subsequently, they would have the greatest increase in
5 noise when compared to current levels.

6 **4.7.2.1 Alternative B/O**

7 *Direct Impacts to Noise Levels*

8 No additional direct impacts to noise levels would be expected beyond the direct impacts listed in
9 Section 4.7.2.

10 *Indirect Impacts to Noise Levels*

11 A noticeable increase in the level of traffic noise (>3 dBA) would be expected for all receptors
12 within approximately one mile of the proposed Control of Access highways proposed under
13 Alternative B/O. Beyond this distance the change in noise would be barely perceptible. There
14 would be an appreciable increase in the level of traffic noise (>10 dBA) for all receptors within
15 approximately ½ mile of the proposed highways proposed under Alternative B/O.

16 One residence would exceed the NAC for category B of 66 dBA, and 124 identified receptors
17 would experience a greater than 10 dBA increase when compared to existing conditions (Figure
18 4-14).

19 **4.7.2.2 Alternative J**

20 *Direct Impacts to Noise Levels*

21 No additional direct impacts to noise levels would be expected beyond the direct impacts listed in
22 Section 4.7.2.

23 *Indirect Impacts to Noise Levels*

24 A noticeable increase in the level of traffic noise (>3 dBA) would be expected for all receptors
25 within approximately one mile of the proposed Control of Access highways. Beyond this distance
26 the change in noise would be barely perceptible. There would be an appreciable increase in the
27 level of traffic noise (>10 dBA) for all receptors within approximately ½ mile of the proposed
28 highways proposed under Alternative J. One residence would exceed the NAC for category B of
29 66 dBA, and 43 identified receptors would experience a greater than 10 dBA increase when
30 compared to existing conditions (Figure 4-15).

31 **4.7.2.3 Alternative P**

32 *Direct Impacts to Noise Levels*

33 No additional impacts to noise levels would be expected beyond the direct impacts listed in
34 Section 4.7.2.

35 *Indirect Impacts to Noise Levels*

36 A noticeable increase in the level of traffic noise (>3 dBA) would be expected for all receptors
37 within approximately one mile of the proposed Control of Access highways. Beyond this distance
38 the change in noise would be barely perceptible. There would be an appreciable increase in the
39 level of traffic noise (>10 dBA) for all receptors within approximately ½ mile of the proposed
40 highways proposed under Alternative P. No receptors would exceed the NAC for category B of
41 66 dBA, but 110 identified receptors would experience a greater than 10 dBA increase when
42 compared to existing conditions (Figure 4-16).

Figure 4-14 Alt B/O- Increased Noise Levels >10dBA

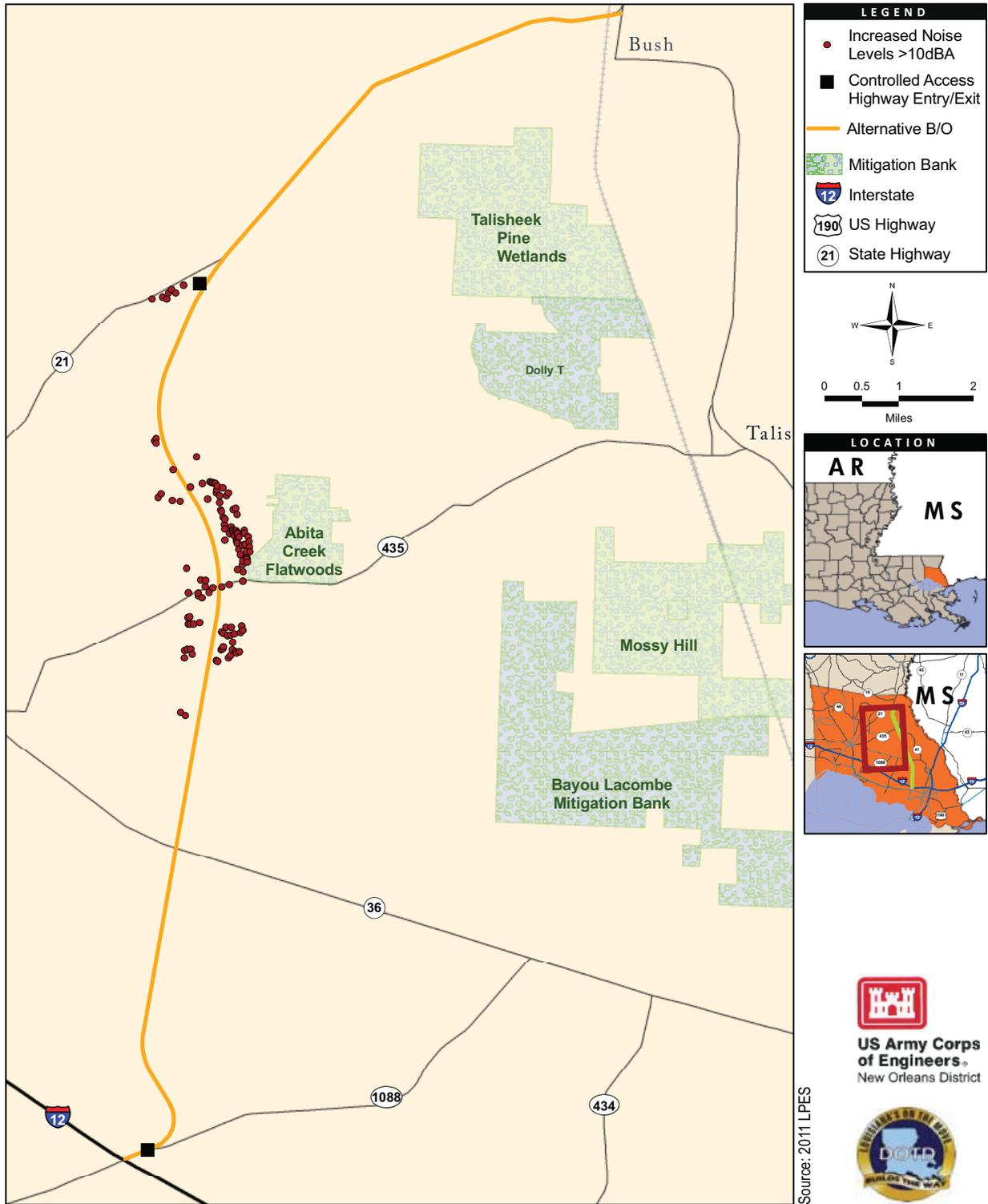
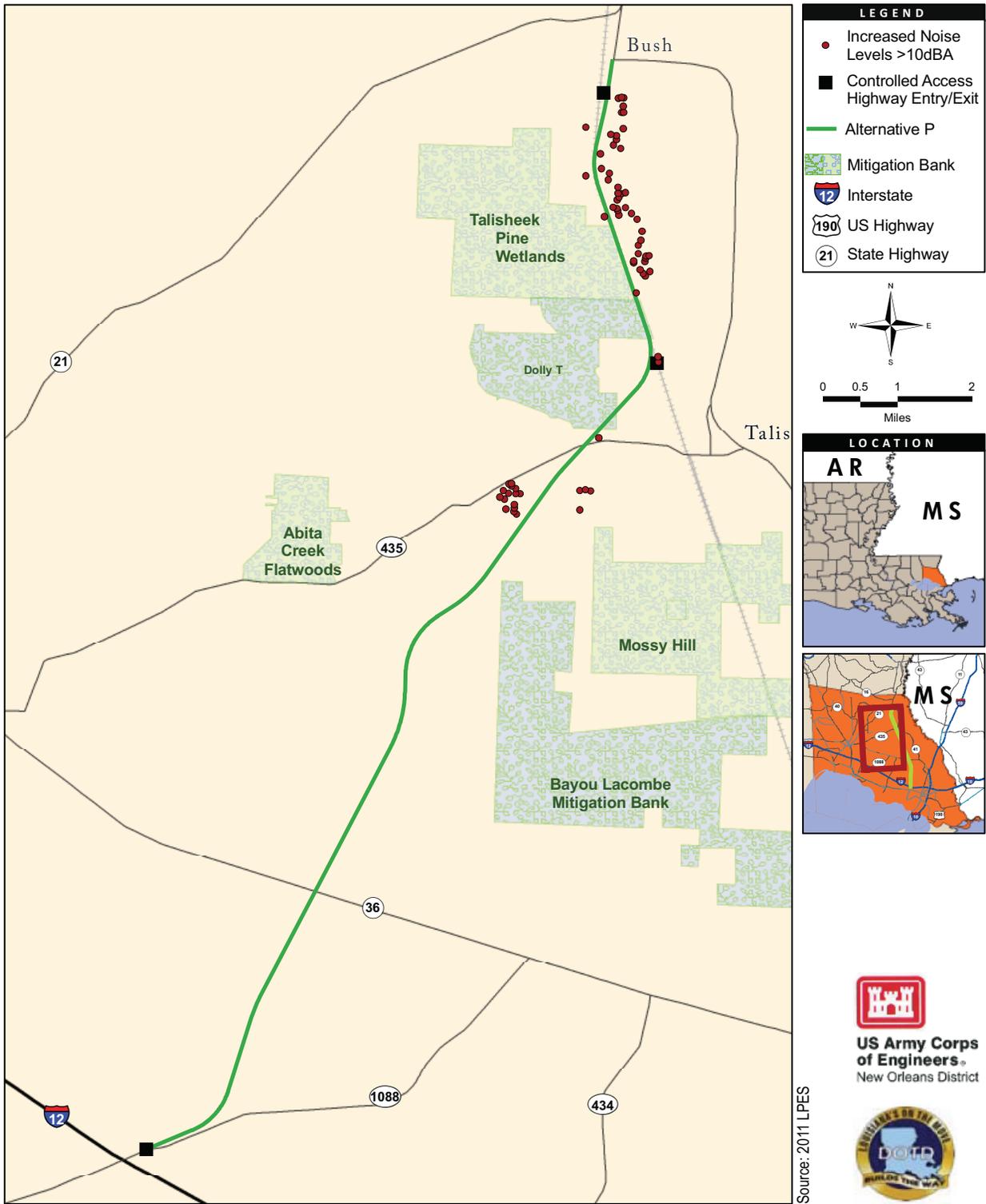


Figure 4-15 Alt J - Increased Noise Levels >10dBA



Figure 4-16 Alt P - Increased Noise Levels >10dBA



4.7.2.4 **Alternative Q**

Direct Impacts to Noise Levels

No additional impacts to noise levels would be expected beyond the direct impacts listed in Section 4.7.2.

Indirect Impacts to Noise Levels

Under Alternative Q, a noticeable increase in the level of traffic noise (>3 dBA) would be expected for all receptors within approximately one mile of the proposed Control of Access highways. Beyond this distance the change in noise would be barely perceptible. There would be an appreciable increase in the level of traffic noise (>10 dBA) for all receptors within approximately one-half mile of the proposed highways. No receptors would exceed the NAC for category B of 66 dBA, but 29 identified receptors would experience a greater than 10 dBA increase when compared to existing conditions (Figure 4-17).

4.8 RECREATION RESOURCES

4.8.1 No Build Alternative

Under the No Build Alternative, construction of the proposed roadway from I-12 to Bush would not be undertaken. Consequently, there would be no direct or indirect impacts to recreation resources within the ROW, or vicinity of, any of the alternative alignment's corridors.

4.8.2 Build Alternatives

Direct and indirect impacts to recreation resources would be expected to be similar for each of the Build Alternatives as described below. Differences in recreation resources impacts between alternatives are described in Sections 4.8.2.1 through 4.8.2.4.

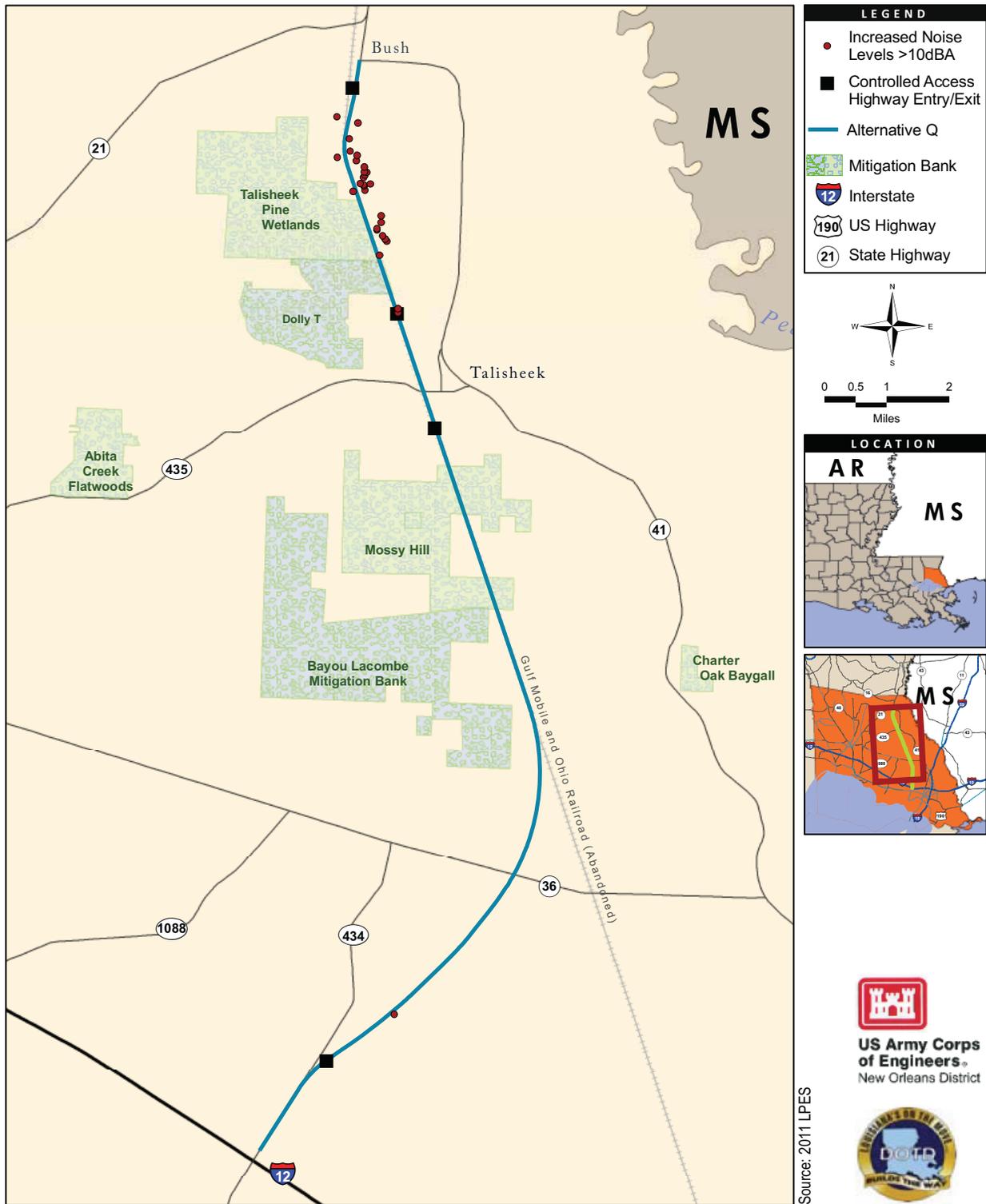
Direct Impacts to Recreational Resources

Long-term direct moderate adverse impacts to recreational resources could result from the implementation of the Build Alternatives. The clearing of undeveloped land to construct new sections of the alignment could result in the loss or degradation of fish and wildlife habitat that are used for nature-based recreation. People traveling to the area for bird watching, hunting and fishing, and other nature-based recreational opportunities could see a decrease in the available natural areas that play host to these opportunities.

Indirect Impacts to Recreational Resources

Short-term and long-term indirect minor adverse impacts to recreational resources could result from the Build Alternatives. Increased runoff and erosion could result from construction activities over the short-term, as well as an increase in impervious surfaces associated with development over the long-term. Increases in runoff and erosion could impact areas used for nature-based recreation by affecting the quality of the fish and wildlife habitat. Additionally, a long-term indirect beneficial impact could result from the implementation of this alternative as increased access opens up the area to more recreational users.

Figure 4-17 Alt Q - Increased Noise Levels >10dBA



1 A control-of-access highway could reduce accessibility to some areas. Forest roads and some
2 parish roads would be crossed where access would be blocked making it more difficult to access
3 the other side of the new highway except by a circuitous route. In addition, the abandoned
4 railroad corridor provides access to a large area with multiple landowners and hunting clubs. The
5 proposed highway could limit access to these areas impacting hunting, bird watching, and other
6 recreational activities in the area.

7 **4.8.2.1 Alternative B/O**

8 *Direct and Indirect Impacts to Recreational Resources*

9 No additional impacts to recreational resources would be expected beyond the impacts listed in
10 Section 4.8.2.

11 **4.8.2.2 Alternative J**

12 *Direct and Indirect Impacts to Recreational Resources*

13 The abandoned railroad currently provides access to a large area with multiple land owners and
14 access to recreational resources in this area would be limited by construction of Alternative J. A
15 baseball field complex less than one-half mile south of LA 41 would be indirectly impacted by
16 the proposed alignment. Alternative J would run adjacent to the east end of the outfields of the
17 baseball field complex, but would not directly impact use of the complex.

18 **4.8.2.3 Alternative P**

19 *Direct and Indirect Impacts to Recreational Resources*

20 The abandoned railroad currently provides access to a large area with multiple land owners and
21 access to recreational resources in this area would be limited by construction of Alternative P. A
22 baseball field complex less than one-half mile south of LA 41 would be indirectly impacted by
23 the proposed alignment. Alternative P would run adjacent to the east end of the outfields of the
24 baseball field complex, but would not directly impact use of the complex.

25 **4.8.2.4 Alternative Q**

26 *Direct and Indirect Impacts to Recreational Resources*

27 The abandoned railroad currently provides access to a large area with multiple land owners and
28 access to recreational resources in this area would be limited by construction of Alternative Q. A
29 baseball field complex less than one-half mile south of LA 41 would be indirectly impacted by
30 the proposed alignment. Alternative Q would run adjacent to the east end of the outfields of the
31 baseball field complex, but would not directly impact use of the complex.

32 **4.9 TRAFFIC AND TRANSPORTATION**

33 A traffic study was prepared to evaluate whether the four alternatives (B/O, P, Q, and J)
34 connecting I-12 to LA 21 met the project purpose and need, in terms of the impact on traffic
35 conditions. The impacts were measured using the volumes of the traffic expected to be diverted
36 from existing routes to the new alignments, the expected LOS and delay conditions compared to
37 those in the existing congested areas, and the difference in travel times between the alternatives
38 and the existing routes. Appendix E provides the full Traffic Study, including detailed
39 methodology and results.

4.9.1 Travel Time Analysis

4.9.1.1 Existing Routes

Three origin/destinations were chosen along I-12 to represent existing travel routes between I-12 and Bush:

- An eastern location, the I-12 at US 11 interchange, that would provide connectivity to Slidell and areas north, south, and east of the study area via the I-12/ I-59/I-10 interchange.
- A western location, the I-12 at US 190 interchange, that would provide access to New Orleans via the Lake Pontchartrain Causeway and also to areas west of the study area.
- A central location, the I-12 at LA 434 interchange, that would provide access to points south of I-12 within St. Tammany Parish and also service trips east and west of the study area between US 190 and US 11.

Based on existing traffic volume data and roadway connectivity, six existing routes were determined to be the major travel routes between Bush and I-12 at the US 190, LA 434, and US 11 interchanges. Figure 4-18 presents these existing routes.

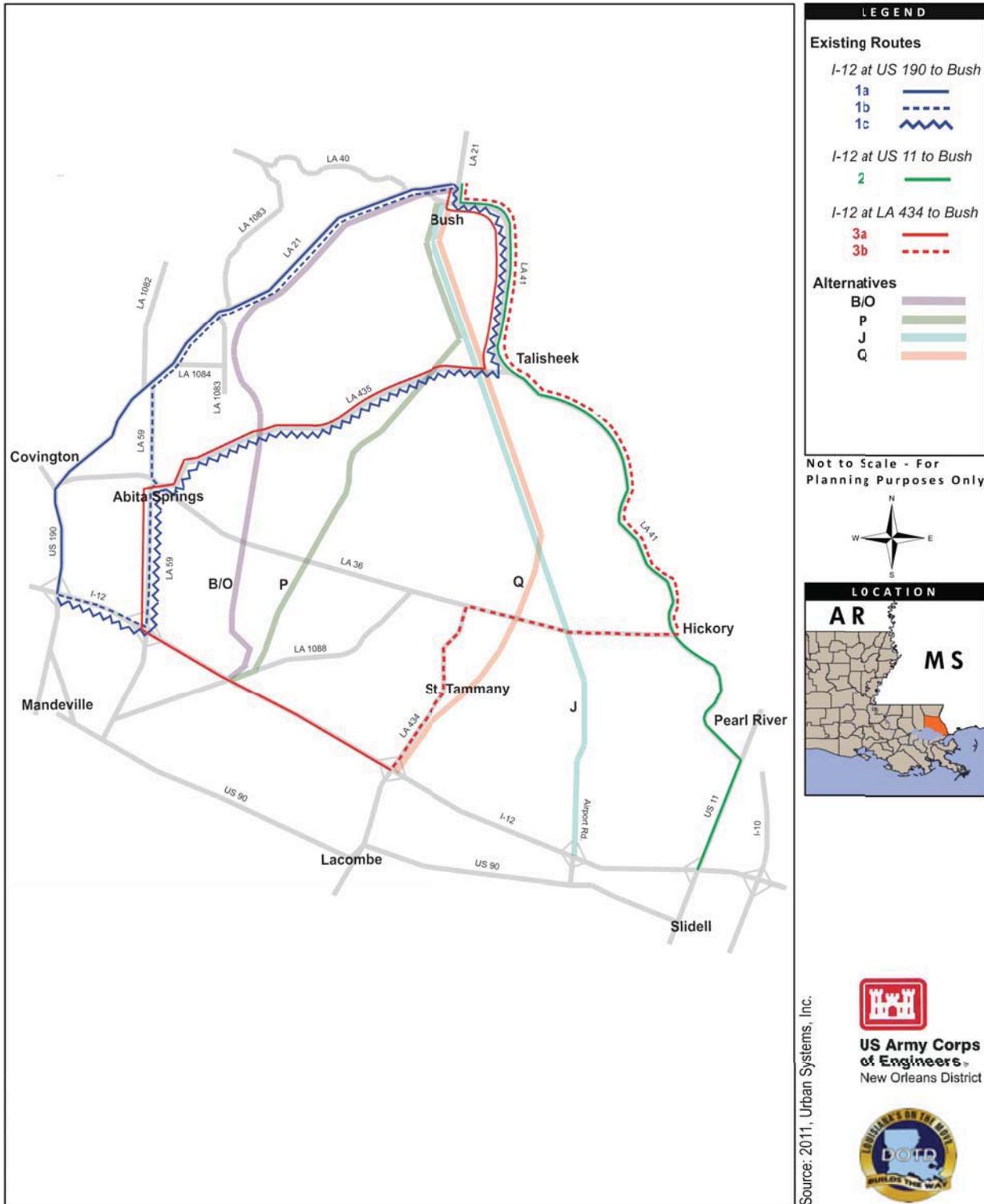
Based on distance and speed, travel times were estimated for the proposed alternative routes B/O, P, Q, and J between Bush and the selected origin/destinations on I-12. The estimations included not only the travel time on the new roadway, but also that on I-12 to reach each of the three origin/destination points.

Travel time-savings for each alternative were calculated based on the existing critical peak direction travel times obtained from the travel time runs. Table 2-1 presents the critical peak direction travel times, estimated travel times, and travel time-savings for each alternative.

A review of Table 2-1 indicates that all four of the alternatives would be expected to provide travel time savings versus at least one of the existing routes based on the three origin-destinations (I-12 to Bush) that were studied; however, the order of magnitude varies greatly.

Alternatives B/O and P would be expected to provide travel time-savings versus existing routes between Bush and both US 190 and LA 434. Alternatives J and Q would be expected to provide travel time-savings versus an existing route between Bush and LA 434. The four alternatives are not expected to provide significant travel time-savings versus the existing route on LA 41 to US 11.

Figure 4-18 Existing Traffic Routes & Alternatives



4.9.2 No Build Alternative Analysis

4.9.2.1 Traffic Assignment and Forecasting

AM and PM peak hour traffic volumes were projected for the 2015 and 2035 No Build conditions for the study area. The following resources were consulted in the development of the traffic volume projections:

- Existing traffic volume data
- Regional Planning Commission's (RPC) Southeast Louisiana (SELA) Travel Forecasting Model in TransCAD version 5.0 r2 Build 1695
- Tetra Tech, Inc.'s REMI model socioeconomic output Previous studies and planned projects

TransCAD uses geographic information, population figures, socioeconomic data, and vehicular origin/destination areas within regional areas to project future traffic volumes. Proposed model modifications to the RPC TransCAD model provided to the RPC included adding roadway links and coding associated attributes, changing roadway link attributes, and changing Traffic Analysis Zone population and employment data. Changes were made based on previous studies and known projects. The output used included average daily traffic volumes and intersection peak period traffic volumes. Appendix E includes further details regarding the traffic modeling.

4.9.2.2 Capacity Analysis

4.9.2.2.1 Roadway Segment Capacity Analysis

A roadway segment capacity analysis was conducted for all study roadway segments for the AM and PM peaks based on the projected No Build volumes and the existing roadway geometry. Figures 4-19 and 4-20 present the No Build projected volumes for 2015, and Figures 4-21 and 4-22 present the volumes for 2035.

Table 4-34 presents a comparison of the 2010 base conditions to the 2015 and 2035 No Build projected conditions LOS and delay for the roadway segments in the AM and PM peaks. The appendix to the Traffic Study in Appendix E includes the roadway segment analysis reports.

4.9.2.2.2 Intersection Capacity Analysis

An intersection capacity analysis was conducted for all study intersections for the AM and PM peaks based on the projected No Build volumes and the existing intersection geometry. Although the timing could be modified over time to service the increased traffic volumes, cycle lengths and timing were kept constant in the analysis.

Tables 4-35 and 4-36 present a comparison of the 2010 base conditions to the 2015 and 2035 No Build projected conditions LOS and delay for the intersections in the AM and PM peaks, respectively. The appendix to the Traffic Study in Appendix E includes the intersection analysis reports.

Figure 4-19 2015 Projected Traffic Volumes - No Build (north)

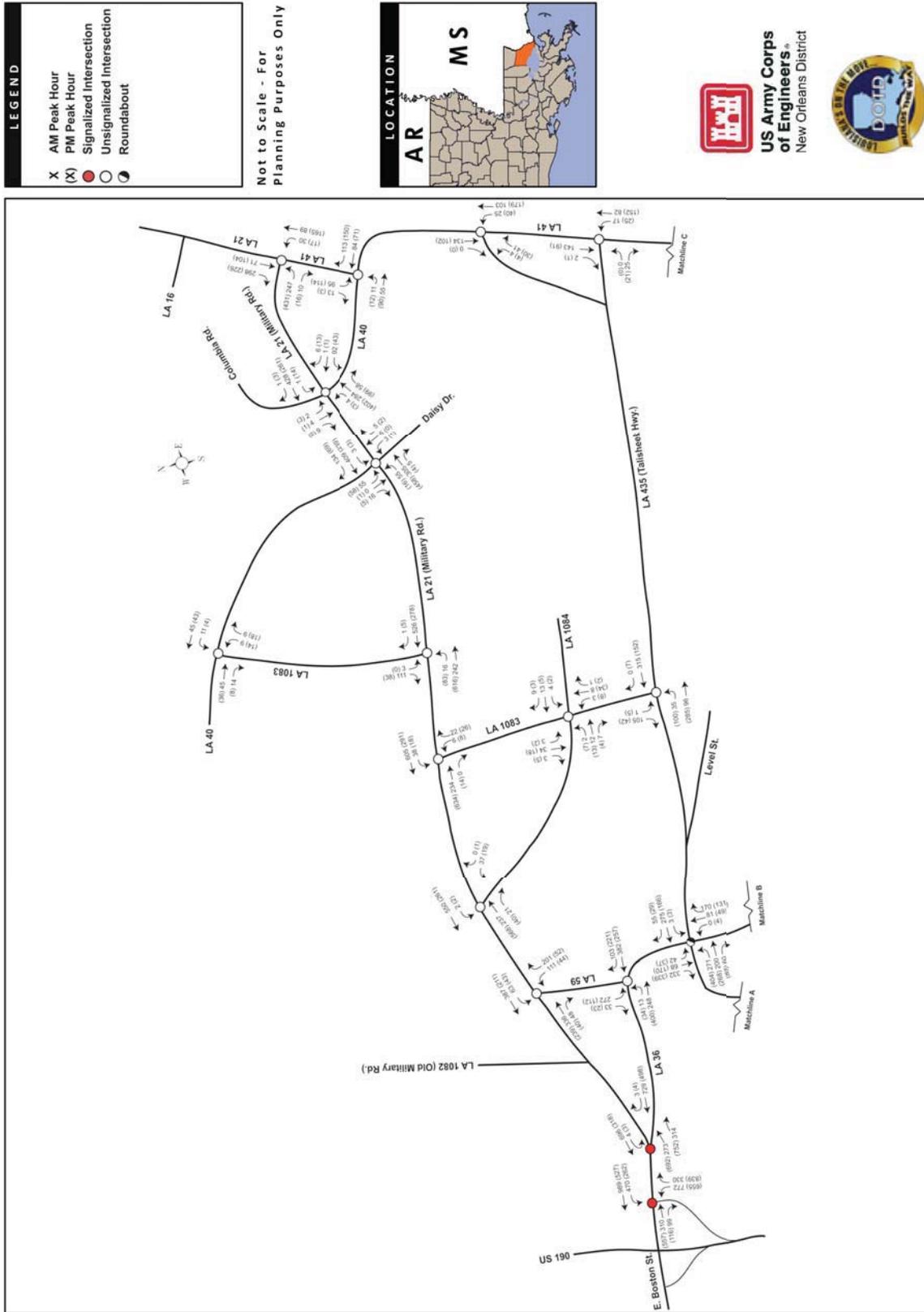


Figure 4-20 2015 Projected Traffic Volumes - No Build (south)

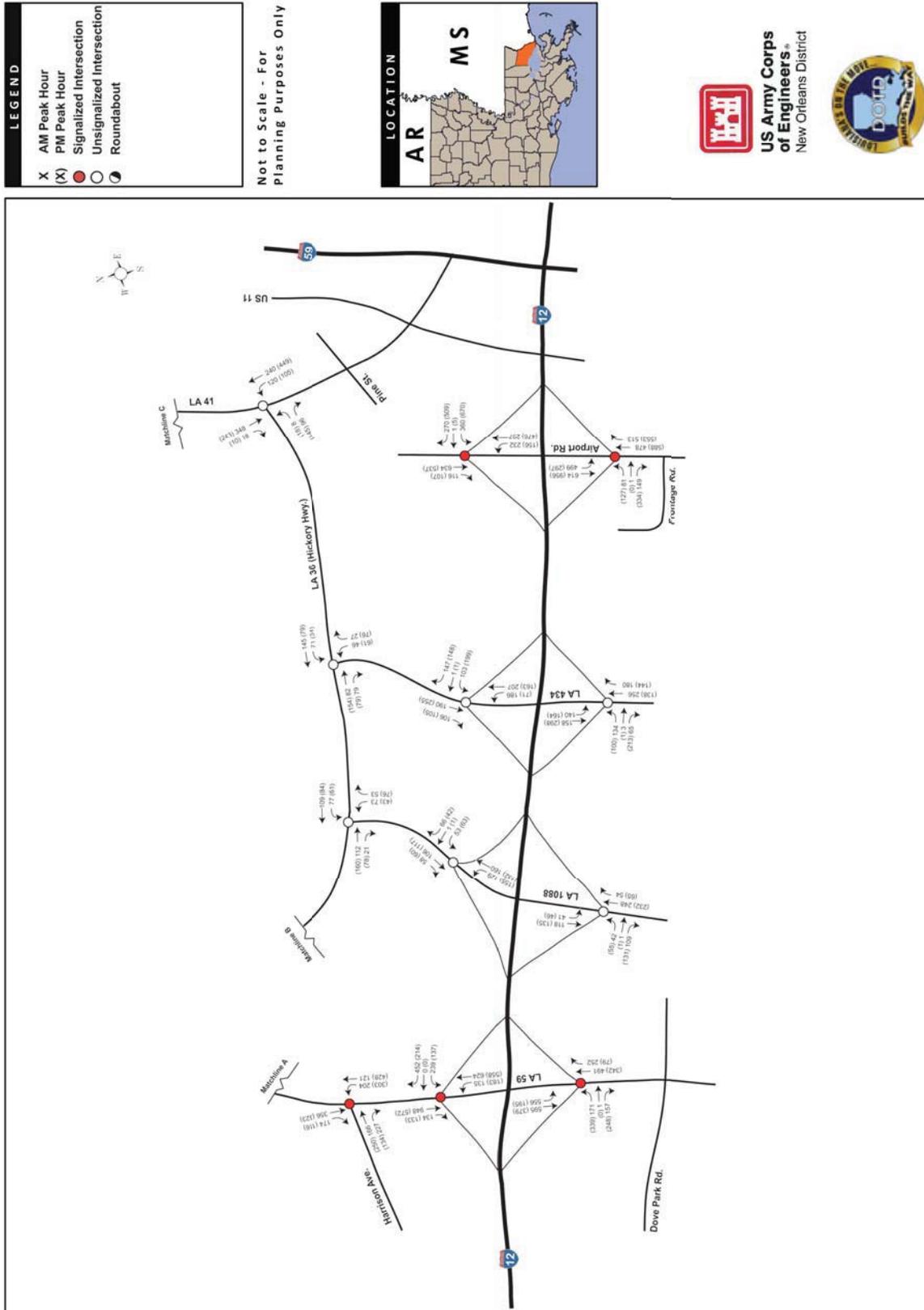
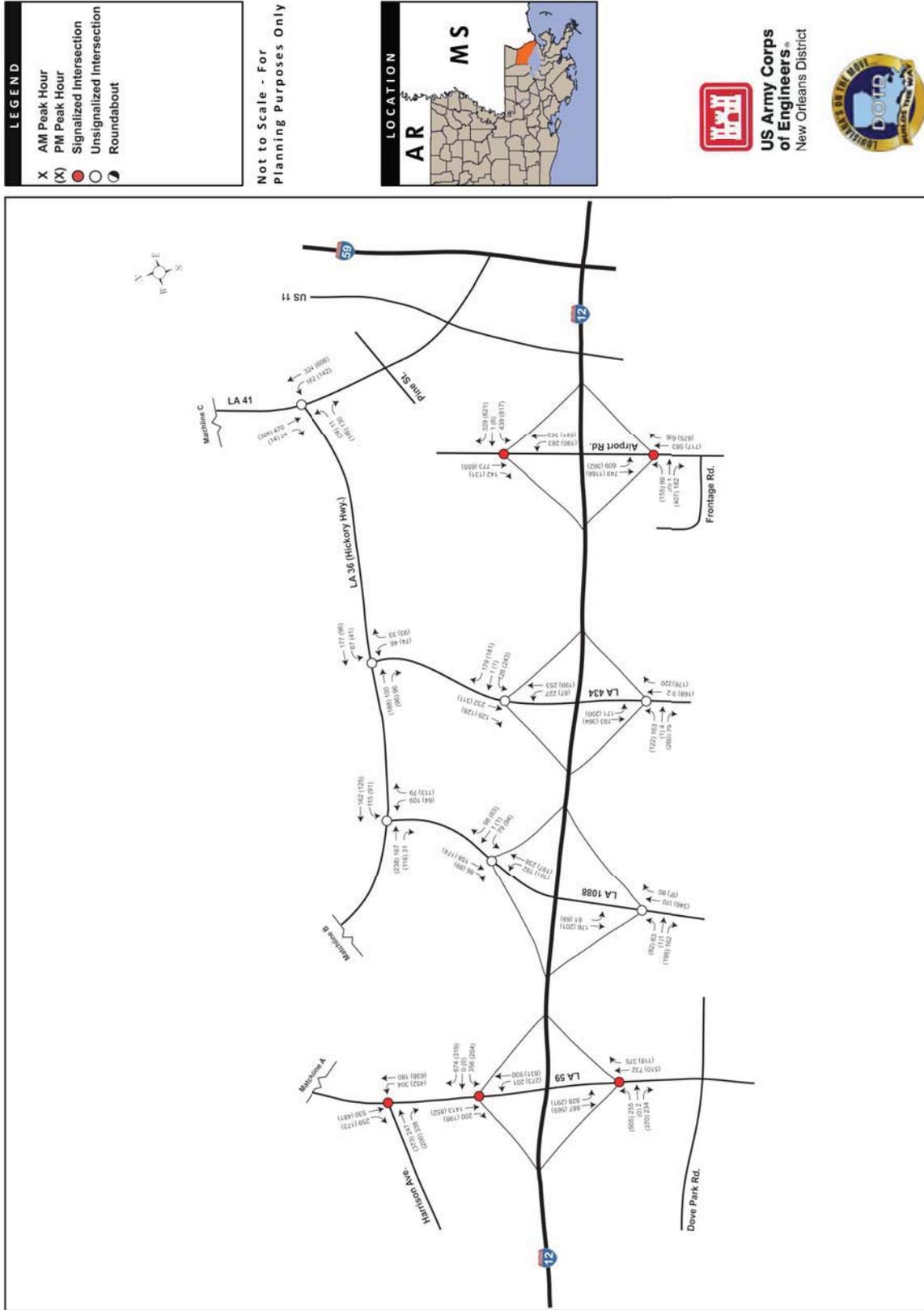


Figure 4-22 2035 Projected Traffic Volumes - No Build (south)



US Army Corps of Engineers
New Orleans District



Source: 2011, Urban Systems, Inc.

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Table 4-34.
Roadway Segments - LOS and capacity analysis results, base and no build conditions

Peak	Roadway Segment	2010		2015 No Build		2035 No Build	
		Base Conditions		Future Conditions		Future Conditions	
		LOS	v/c	LOS	v/c	LOS	v/c
AM	LA 40 between LA 1083 and LA 21	D	0.05	D	0.06	D	0.08
	LA 41 between LA 40 and LA 435	C	0.09	C	0.10	C	0.13
	LA 21 between LA 40 and LA 1083	D	0.27	D	0.29	D	0.39
	LA 21 between LA 1084 and LA 1083	D	0.28	D	0.30	E	0.41
	LA 21 between LA 59 and LA 1084	D	0.30	D	0.32	D	0.43
	LA 21 between LA 36 and LA 1082	D	0.30	D	0.32	E	0.43
	LA 59 between LA 21 and LA 36	D	0.12	D	0.13	D	0.19
	LA 59 between LA 36 and I-12	E	0.42	E	0.46	E	0.68
	LA 435 between LA 1083 and Peg Keller	D	0.11	D	0.11	D	0.14
	LA 435 between White Oaks and LA 41	C	0.04	C	0.04	D	0.05
	LA 1083 between LA 1084 and LA 435	C	0.04	C	0.04	C	0.05
	LA 1083 between LA 21 and LA 1084	C	0.03	C	0.03	C	0.04
	LA 1084 between LA 21 and LA 1083	C	0.03	D	0.03	D	0.04
	LA 36 between LA 21 and LA 59	E	0.27	E	0.28	E	0.34
	LA 36 between LA 435 and LA 1088	C	0.08	C	0.08	C	0.10
	LA 36 between LA 434 and LA 41	C	0.10	C	0.11	D	0.13
	LA 36 between LA 1088 and LA 434	C	0.10	C	0.11	D	0.13
	LA 1088 between LA 36 and I-12	C	0.05	D	0.16	D	0.24
	LA 434 between LA 36 and I-12	D	0.12	D	0.13	D	0.15
	Airport Rd north of I-12	E	0.39	E	0.41	E	0.50
PM	LA 40 between LA 1083 and LA 21	D	0.04	D	0.04	D	0.06
	LA 41 between LA 40 and LA 435	C	0.12	C	0.13	D	0.17
	LA 21 between LA 40 and LA 1083	D	0.25	D	0.27	D	0.37
	LA 21 between LA 1084 and LA 1083	D	0.31	D	0.33	E	0.44
	LA 21 between LA 59 and LA 1084	D	0.31	D	0.33	D	0.45
	LA 21 between LA 36 and LA 1082	D	0.28	D	0.30	E	0.41
	LA 59 between LA 21 and LA 36	D	0.16	D	0.17	D	0.26
	LA 59 between LA 36 and I-12	E	0.54	E	0.59	F	0.88
	LA 435 between LA 1083 and Peg Keller	D	0.13	D	0.14	D	0.17
	LA 435 between White Oaks and LA 41	C	0.04	C	0.04	C	0.05
	LA 1083 between LA 1084 and LA 435	C	0.03	C	0.04	C	0.04
	LA 1083 between LA 21 and LA 1084	C	0.02	C	0.02	C	0.03
	LA 1084 between LA 21 and LA 1083	D	0.03	D	0.03	D	0.04
	LA 36 between LA 21 and LA 59	E	0.35	E	0.37	E	0.45
	LA 36 between LA 435 and LA 1088	C	0.09	C	0.09	C	0.11
	LA 36 between LA 434 and LA 41	C	0.11	C	0.11	D	0.14
	LA 36 between LA 1088 and LA 434	C	0.10	C	0.10	D	0.12
	LA 1088 between LA 36 and I-12	C	0.04	D	0.16	D	0.23
	LA 434 between LA 36 and I-12	D	0.12	D	0.13	D	0.16
	Airport Rd north of I-12	E	0.54	E	0.57	E	0.69

Legend

 Capacity constrained (LOS E or worse)

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Table 4-35. Intersections - LOS and capacity analysis results, base and no build conditions: am peak

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Intersection	Direction	2010		2015 No Build		2035 No Build	
		Base Conditions		Future Conditions		Future Conditions	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)
LA 21 at LA 40 (west int.)	Overall	*	*	*	*	*	*
	Northbound	C	21.1	C	23.7	F	52.7
	Southbound	D	30.4	E	39.2	F	328.6
	Eastbound	A	9.0	A	9.2	B	10.4
	Westbound	A	8.0	A	8.1	A	8.5
LA 21 at LA 40 (east int.)	Overall	*	*	*	*	*	*
	Northbound	D	25.4	D	31.7	F	179.9
	Southbound	B	14.3	B	14.9	C	20.4
	Eastbound	A	8.2	A	8.3	A	8.8
	Westbound	A	8.1	A	8.2	A	8.7
LA 21 at LA 41	Overall	*	*	*	*	*	*
	Northbound	A	7.5	A	7.5	A	7.6
	Southbound						
	Eastbound	C	16.5	C	18.2	E	44.2
	Westbound						
LA 21 at LA 1084	Overall	*	*	*	*	*	*
	Southbound	A	7.9	A	8.0	A	8.3
	Westbound	C	19.1	C	21.3	E	43.2
LA 21 at LA 36	Overall	D	49.8	F	95.1	F	287.9
	Northbound	B	15.7	B	16.1	C	20.6
	Southbound	E	64.0	F	121.8	F	367.1
	Westbound	D	51.3	F	104.5	F	329.4
	Overall	D	47.4	E	64.0	F	183.6
US 190 at LA 21 (east int.)	Northbound	F	136.5	F	187.2	F	475.7
	Eastbound	C	23.2	C	24.6	D	54.7
	Westbound	A	8.1	B	10.8	E	64.8
	Overall	B	12.1	B	15.0	F	125.8
	Northbound	B	13.6	C	20.1	F	302.2
LA 435/LA 59 at LA 36**	Southbound	B	13.4	C	16.5	F	129.9
	Eastbound	B	10.5	B	11.2	E	52.7
	Westbound	B	12.0	C	15.5	F	110.4
	Overall	*	*	*	*	*	*
	Southbound	E	44.2	F	81.6	F	769.6
LA 36 at LA 59	Eastbound	A	8.5	A	8.6	A	9.7
	Overall	*	*	*	*	*	*
	Northbound	F	236.1	F	399.5	F	2273.0
LA 21 at LA 59	Westbound	A	8.7	A	8.9	B	10.6
	Overall	C	31.3	D	36.6	F	84.7
	Northbound	A	5.7	A	6.1	B	14.1
LA 59 at Harrison Ave.	Southbound	B	16.1	B	17.3	C	32.7
	Eastbound	E	75.6	F	91.4	F	222.4
	Overall	C	30.4	C	31.0	F	84.0
	Northbound	A	7.5	A	7.2	B	10.8
I-12 at LA 59 (WB)	Southbound	B	18.3	B	19.5	D	52.5
	Westbound	E	76.4	F	82.6	F	235.6
	Overall	D	37.9	D	40.7	F	179.4
	Northbound	B	14.2	B	12.6	B	15.9
I-12 at LA 59 (EB)	Southbound	E	60.5	E	62.0	F	328.9
	Eastbound	C	33.6	C	32.0	D	42.5
	Overall	*	*	*	*	*	*
	Northbound	A	8.1	A	8.2	A	8.5
I-12 at LA 434 (WB)	Southbound						
	Westbound	B	14.0	C	17.0	E	42.2
	Overall	*	*	*	*	*	*
I-12 at LA 434 (EB)	Northbound						
	Southbound	A	8.2	A	8.3	A	8.7
	Eastbound	C	23.6	D	27.9	F	80.3
	Overall	D	42.6	D	48.0	E	79.3
I-12 at Airport Rd. (WB)	Northbound	A	8.1	A	8.9	C	22.3
	Southbound	B	17.3	B	17.6	B	19.5
	Westbound	F	106.8	F	122.8	F	207.7
	Overall	C	21.1	C	22.7	D	41.4
I-12 at Airport Rd. (EB)	Northbound	C	25.1	C	25.9	C	32.2
	Southbound	B	16.7	B	18.8	D	46.1
	Eastbound	C	34.5	C	34.7	D	35.9
	Overall	*	*	*	*	*	*
LA 36 at LA 1088	Northbound	B	10.6	C	16.8	F	72.7
	Westbound	A	7.6	A	7.9	A	8.3
	Overall	*	*	*	*	*	*
LA 36 at LA 41	Northbound	A	8.6	A	8.7	A	9.7
	Eastbound	B	13.0	B	13.9	C	22.2
	Overall						
LA 3241 at LA 435	Northbound						
	Southbound						
	Eastbound						
	Westbound						

Legend
 Capacity constrained (LOS E or worse)
 Intersection or interaction approach does not exist or uncontrolled approach with the right of way and
 * Overall LOS not available for two-way stop-controlled intersections.
 ** Roundabout analysis in SCRA.

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Table 4-36. Intersections - LOS and capacity analysis results, base and no build conditions: PM Peak

Intersection	Direction	2010		2015 No Build		2035 No Build	
		Base Conditions		Future Conditions		Future Conditions	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)
LA 21 at LA 40 (west int.)	Overall	*	*	*	*	*	*
	Northbound	C	21.1	C	23.7	F	52.7
	Southbound	D	30.4	E	39.2	F	328.6
	Eastbound	A	9.0	A	9.2	B	10.4
	Westbound	A	8.0	A	8.1	A	8.5
LA 21 at LA 40 (east int.)	Overall	*	*	*	*	*	*
	Northbound	D	25.4	D	31.7	F	179.9
	Southbound	B	14.3	B	14.9	C	20.4
	Eastbound	A	8.2	A	8.3	A	8.8
	Westbound	A	8.1	A	8.2	A	8.7
LA 21 at LA 41	Overall	*	*	*	*	*	*
	Northbound	A	7.5	A	7.5	A	7.6
	Southbound						
	Eastbound	C	16.5	C	18.2	E	44.2
	Westbound						
LA 21 at LA 1084	Overall	*	*	*	*	*	*
	Southbound	A	7.9	A	8.0	A	8.3
	Westbound	C	19.1	C	21.3	E	43.2
LA 21 at LA 36	Overall	D	49.8	F	95.1	F	287.9
	Northbound	B	15.7	B	16.1	C	20.6
	Southbound	E	64.0	F	121.8	F	367.1
	Westbound	D	51.3	F	104.5	F	329.4
US 190 at LA 21 (east int.)	Overall	D	47.4	E	64.0	F	183.6
	Northbound	F	136.5	F	187.2	F	475.7
	Eastbound	C	23.2	C	24.6	D	54.7
	Westbound	A	8.1	B	10.8	E	64.8
LA 435/LA 59 at LA 36**	Overall	B	12.1	B	15.0	F	125.8
	Northbound	B	13.6	C	20.1	F	302.2
	Southbound	B	13.4	C	16.5	F	129.9
	Eastbound	B	10.5	B	11.2	E	52.7
	Westbound	B	12.0	C	15.5	F	110.4
LA 36 at LA 59	Overall	*	*	*	*	*	*
	Southbound	E	44.2	F	81.6	F	769.6
	Eastbound	A	8.5	A	8.6	A	9.7
LA 21 at LA 59	Overall	*	*	*	*	*	*
	Northbound	F	236.1	F	399.5	F	2273.0
	Westbound	A	8.7	A	8.9	B	10.6
LA 59 at Harrison Ave.	Overall	C	31.3	D	36.6	F	84.7
	Northbound	A	5.7	A	6.1	B	14.1
	Southbound	B	16.1	B	17.3	C	32.7
	Eastbound	E	75.6	F	91.4	F	222.4
I-12 at LA 59 (WB)	Overall	C	30.4	C	31.0	F	84.0
	Northbound	A	7.5	A	7.2	B	10.8
	Southbound	B	18.3	B	19.5	D	52.5
	Westbound	E	76.4	F	82.6	F	235.6
I-12 at LA 59 (EB)	Overall	D	37.9	D	40.7	F	179.4
	Northbound	B	14.2	B	12.6	B	15.9
	Southbound	E	60.5	E	62.0	F	328.9
	Eastbound	C	33.6	C	32.0	D	42.5
I-12 at LA 434 (WB)	Overall	*	*	*	*	*	*
	Northbound	A	8.1	A	8.2	A	8.5
	Southbound						
	Westbound	B	14.0	C	17.0	E	42.2
I-12 at LA 434 (EB)	Overall	*	*	*	*	*	*
	Northbound						
	Southbound	A	8.2	A	8.3	A	8.7
	Eastbound	C	23.6	D	27.9	F	80.3
I-12 at Airport Rd. (WB)	Overall	D	42.6	D	48.0	E	79.3
	Northbound	A	8.1	A	8.9	C	22.3
	Southbound	B	17.3	B	17.6	B	19.5
	Westbound	F	106.8	F	122.8	F	207.7
I-12 at Airport Rd. (EB)	Overall	C	21.1	C	22.7	D	41.4
	Northbound	C	25.1	C	25.9	C	32.2
	Southbound	B	16.7	B	18.8	D	46.1
	Eastbound	C	34.5	C	34.7	D	35.9
LA 36 at LA 1088	Overall	*	*	*	*	*	*
	Northbound	B	10.6	C	16.8	F	72.7
	Westbound	A	7.6	A	7.9	A	8.3
LA 36 at LA 41	Overall	*	*	*	*	*	*
	Northbound	A	8.6	A	8.7	A	9.7
	Eastbound	B	13.0	B	13.9	C	22.2
LA 3241 at LA 435	Overall						
	Northbound						
	Southbound						
	Westbound						

Legend
 Capacity constrained (LOS E or worse)
 Intersection or intersection approach does not exist or uncontrolled approach with the right-of-way and
 * Overall LOS not available for two-way stop-controlled intersections.
 ** Roundabout analysis in SBPA.

4.9.2.2.3 Summary of Results

A review of Tables 4-34, 4-35, and 4-36 indicates the conditions in the study area would be expected to worsen between 2015 and 2035 without improvements or the introduction of an alternate route. In 2015, capacity constraints would be expected primarily on the LA 21 and LA 59 corridors and to be concentrated in the northern and western portions of the study area, with the exception of the increased delays at the I-12 at Airport Road interchange. Existing areas of delay or congestion would be expected to worsen and expand to additional locations. In 2035, capacity constraints would be expected not only in the northern and western portions of the study area and at the I-12 at Airport Road interchange, but also to include additional intersections on LA 21 and LA 59.

Figure 4-23 illustrates where capacity constraints would be expected for the 2035 Projected No Build conditions.

4.9.3 Build Alternatives Analysis

4.9.3.1 Traffic Assignment and Forecasting

AM and PM peak hour traffic volumes were projected for the 2015 and 2035 Build Alternatives. In addition to the resources consulted in the development of the No Build volume projections, preliminary line and grade plans were used to develop link geometry and determine appropriate link attributes in the TransCAD model.

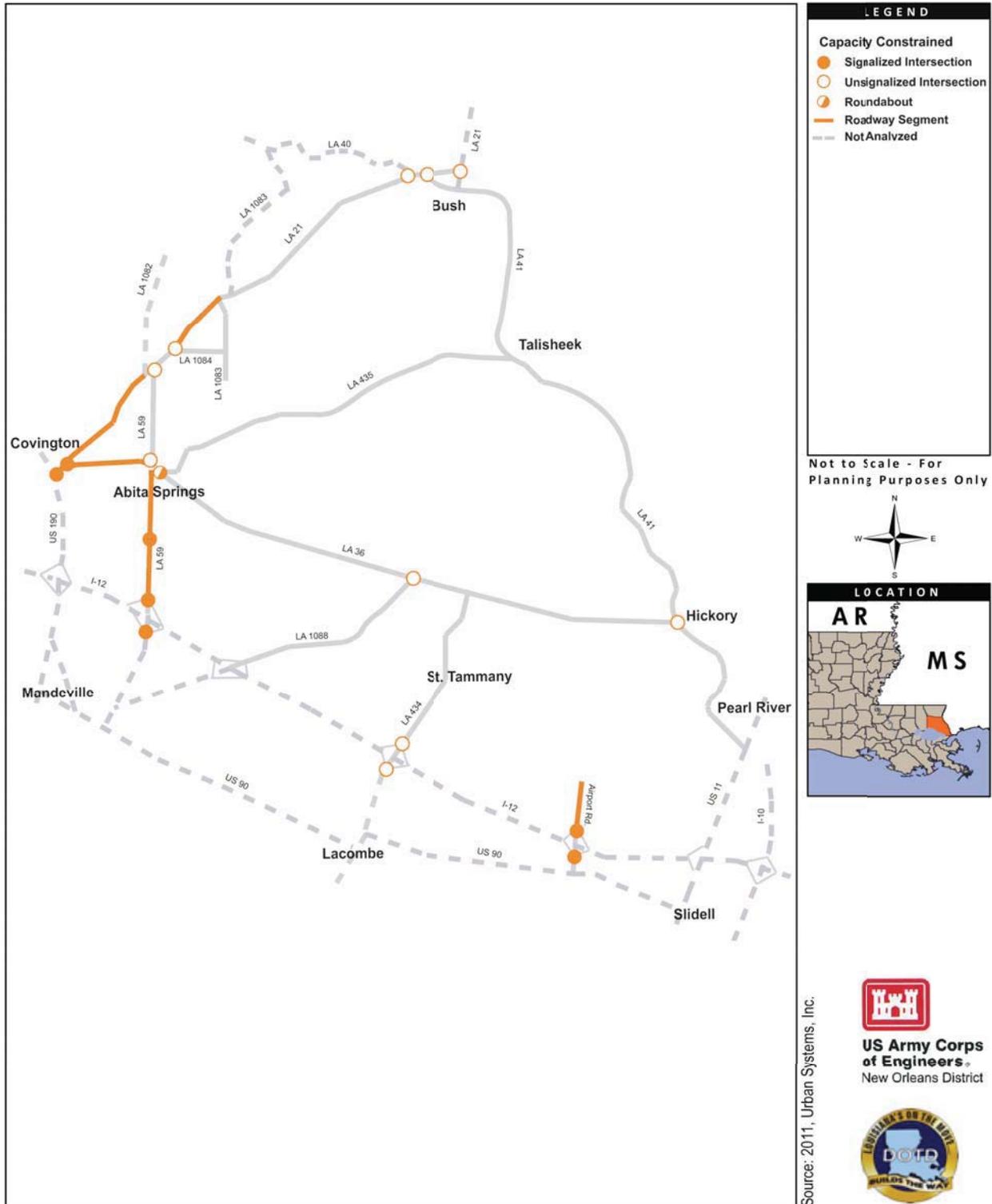
The 2035 Build scenarios were created first to assist the project team in determining overall design parameters for the proposed alignments. The 2035 No Build model scenario was used to create the 2035 Build Alternative B/O, J, P, and Q model scenarios. Appendix E includes further details regarding the traffic modeling.

The TransCAD ADT and intersection peak period traffic volume output were reviewed to determine the impact of the Build Alternative alignments in terms of redistributing traffic in the study network. Alternatives B/O and P are connected to the western portion of the study area (where existing congestion is concentrated) and the model indicated significant traffic from both LA 21 and LA 59 would divert to the new routes. Alternatives Q and J are connected to the eastern portion of the study area and the model indicated mainly traffic from LA 41 would divert to the new routes. The TransCAD modeling results were translated into the 2015 and 2035 design hour turning movement volumes.

The analysis of all study area intersections for the No Build conditions established where existing congestion is present and where it is expected in the future. Each alternative is not expected to affect all study area intersections. Therefore, specific intersections were selected for each alternative to capture the impact of the new alignment on expected LOS and delay conditions. For each alternative, the intersections along the alignment were analyzed, as were intersections expected to experience the greatest change in demand due to rerouting to the new roadway.

Appendix E presents the projected Build Alternative volumes for the selected intersections for each alternative.

Figure 4-23 2035 Projected No Build Capacity Constraints



4.9.3.2 Intersection Capacity Analysis

The initial assumption for the capacity analysis conducted for the intersections along each alternative was a four-lane divided roadway with stop control on the side streets. Existing roadways were assumed to “T” into the alignments to give the right of way to the through movements on the new roadway.

When unsignalized analysis with the 2015 and 2035 Build design hour volumes, four-lane roadway section, and existing cross street sections did not indicate acceptable operating conditions, improvements were developed to include additional lanes and/or signalization. At the selected signalized intersections associated with each alternative, improvements were developed where needed to indicate acceptable operating conditions, including additional lanes and changes to signal operation.

Table 4-37 presents the resulting recommended traffic control and improvements, where applicable, in addition to the basic four-lane undivided roadway for the selected intersections for each Build Alternative under 2015 and 2035 projected traffic demand.

Results of the initial capacity analyses of the intersections along the 2015 Build Alternative alignments indicated 2035 Build signalization and additional lanes may not be needed initially at certain locations and could be installed or constructed when demand increases.

For the study intersections not on the alternatives, intersection capacity analysis was conducted based on the projected Build Alternative volumes and the existing intersection geometry. Although the timing would potentially be modified over time to service the increased traffic volumes, cycle lengths and timing were kept constant in the analysis.

Tables 4-38 and 4-39 present a summary of the AM and PM peak LOS and delay estimates for the selected Build study intersections, based on the proposed geometry and traffic control, respectively. The appendix to the Traffic Study in Appendix E includes the intersection analysis reports.

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Table 4-37.
Build alternative intersection recommendations

Intersection	2015 Recommendations	2035 Recommendations
Alt B/O at LA 21/LA 41	LA 41 to "T" into LA B/O / LA 21. Provide separate right and left turn lanes and stop control on the LA 41 approach.	
Alt B/O / LA 21 at LA 40 (east intersection)	Stop control on side street approaches.	
Alt B/O / LA 21 at LA 40 (west intersection)	Stop control on side street approaches.	
Alt B/O at LA 21	Stop control on side approaches or a roundabout could be considered.	
Alt B/O at LA 435	Stop control on side street approaches.	
Alt B/O at LA 36	Add an exclusive EBL lane on LA 36. Stop control on side street approaches.	Add an exclusive EBL lane on LA 36. Signalize the intersection.
Alt B/O at LA 36	Add an exclusive EBL lane on LA 36. Stop control on side street approaches.	
Alt B/O at LA 1088	Stop control on side street approaches.	
Alt B/O: I-12 WB ramp at LA 1088	Stop control on side street approaches.	Signalize the intersection.
Alt B/O: I-12 EB ramp at LA 1088	Stop control on side street approaches.	Signalize the intersection.
Alt J at LA 21/LA 41	Stop control on side street approaches.	
Alt J at LA 435	Stop control on side street approaches.	
Alt J at LA 36	Stop control on side approaches or a roundabout could be considered.	Signalize the intersection or a roundabout could be considered.
Alt J: I-12 ramps at Airport Rd	Widen Airport Road to provide an additional NBT lane. At the WB ramp intersection, provide a second WBR lane. At the EB ramp intersection, provide a second exclusive SBL lane.	Widen Airport Road to provide an additional NBT lane. At the WB ramp intersection, provide a second WBR lane and an exclusive SBR lane. At the EB ramp intersection, provide a second EBL lane and a second exclusive SBL lane.
	Or construction of the single point urban interchange (SPUI) configuration as specified in the <i>I-12 @ Airport Rd Single Point Urban Interchange Stage 0 Feasibility Study</i> (Buchart Horn, Inc., January 2011) with a second WBR lane at the off-ramp may be considered.	
Alt P at LA 21/LA 41	Stop control on side street approaches.	
Alt P at LA 435	Stop control on side street approaches.	
Alt P at LA 36	Signalize the intersection.	
Alt P at LA 1088	Stop control on side street approaches.	Provide exclusive WBL and WBR lanes on LA 1088. Stop control on side approaches.
Alt P: I-12 WB ramp at LA 1088	Stop control on side street approaches.	Signalize the intersection.
Alt P: I-12 EB ramp at LA 1088	Signalize the intersection.	Add a second SBL lane and signalize the intersection.
Alt Q at LA 21/LA 41	Stop control on side street approaches.	
Alt Q at LA 435	Stop control on side street approaches.	
Alt Q at LA 36	Stop control on side street approaches.	Provide an exclusive WBL lane on LA 36. Stop control on side approaches.
Alt Q at LA 434	Stop control on side street approaches.	
Alt Q: I-12 WB ramp at LA 434	Stop control on side street approaches.	Signalize the intersection.
Alt Q: I-12 EB ramp at LA 434	Signalize the intersection.	

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Direction	2010				2015 No Build				2015 Build				2035 No Build				2035 Build				
	Base Conditions		Future Conditions		Alternative B/O		Alternative J		Alternative P		Alternative Q		Alternative B/O		Alternative J		Alternative P		Alternative Q		
	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	
Overall	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Northbound	C	21.1	C	23.7	C	15.1	C	15.1	C	15.1	C	15.1	C	15.1	C	15.1	C	15.1	C	15.1	
Southbound	D	30.4	E	39.2	C	17.3	C	17.3	C	17.3	C	17.3	C	17.3	C	17.3	C	17.3	C	17.3	
Eastbound	A	9.0	A	9.2	A	9.3	A	9.3	A	9.3	A	9.3	A	9.3	A	9.3	A	9.3	A	9.3	
Westbound	A	8.0	A	8.1	A	8.0	A	8.0	A	8.0	A	8.0	A	8.0	A	8.0	A	8.0	A	8.0	
Overall	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Northbound	D	25.4	D	31.7	C	16.1	C	16.1	C	16.1	C	16.1	C	16.1	C	16.1	C	16.1	C	16.1	
Southbound	B	14.3	B	14.9	B	11.6	B	11.6	B	11.6	B	11.6	B	11.6	B	11.6	B	11.6	B	11.6	
Eastbound	A	8.2	A	8.3	A	8.5	A	8.5	A	8.5	A	8.5	A	8.5	A	8.5	A	8.5	A	8.5	
Westbound	A	8.1	A	8.2	A	8.1	A	8.1	A	8.1	A	8.1	A	8.1	A	8.1	A	8.1	A	8.1	
Overall	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Northbound	A	7.5	A	7.5	A	8.0	A	8.0	A	8.0	A	8.0	A	8.0	A	8.0	A	8.0	A	8.0	
Southbound	C	16.5	C	18.2	A	8.0	C	20.1	B	12.1	C	17.8	E	44.2	F	55.6	C	16.3	E	36.9	
Eastbound	B	10.5	B	10.5	B	10.5	B	10.5	B	10.5	B	10.5	B	10.5	B	10.5	B	10.5	B	10.5	
Westbound	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Overall	A	7.9	A	8.0	A	8.0	A	8.0	A	8.0	A	8.0	A	8.0	A	8.0	A	8.0	A	8.0	
Northbound	C	19.1	C	21.3	C	21.3	C	21.3	C	21.3	C	21.3	C	21.3	C	21.3	C	21.3	C	21.3	
Overall	D	49.8	F	95.1	E	66.3	E	67.2	E	68.0	E	70.1	F	287.9	F	216.7	F	213.7	F	293.3	
Northbound	B	15.7	B	16.1	B	16.1	B	15.8	B	13.6	B	15.5	B	20.6	B	18.6	B	14.7	B	18.5	
Southbound	E	64.0	F	121.8	C	30.7	C	52.0	C	24.8	E	58.0	F	367.1	F	160.7	F	134.0	F	263.3	
Westbound	D	51.4	F	104.5	F	109.9	F	100.0	F	100.0	F	100.0	F	329.4	F	324.6	F	302.8	F	302.8	
Overall	D	47.3	E	64.0	E	66.0	E	65.1	E	69.3	E	64.8	F	181.5	F	165.5	F	178.4	F	181.7	
Northbound	F	136.5	F	187.2	F	187.2	F	187.2	F	187.2	F	187.2	F	475.7	F	475.7	F	475.7	F	475.7	
Eastbound	C	23.2	C	24.6	C	24.3	C	24.6	C	21.2	C	23.8	D	54.7	D	54.7	D	54.7	D	54.7	
Westbound	A	8.1	A	10.8	A	6.4	A	9.4	A	6.3	A	9.2	E	64.8	E	15.8	E	28.3	E	56.1	
Overall	B	12.1	B	15.0	B	17.3	B	14.9	B	10.7	B	12.4	F	125.8	F	91.4	F	57.3	F	69.7	
Northbound	C	13.6	C	20.1	C	20.3	C	19.1	C	11.8	C	15.2	F	302.2	F	100.6	F	55.1	F	151.1	
Southbound	B	13.4	C	16.5	B	15.6	B	14.1	B	10.7	B	12.8	F	129.9	F	85.5	F	59.4	F	83.3	
Eastbound	B	10.5	B	11.2	C	16.8	B	14.6	B	10.6	B	10.8	E	52.7	F	108.8	F	44.1	C	31.4	
Westbound	B	12.0	C	15.5	C	17.1	B	13.6	B	10.2	B	12.5	F	110.4	E	68.0	E	73.6	E	55.9	
Overall	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Southbound	E	44.2	F	81.6	A	8.0	A	8.0	A	8.0	A	8.0	A	8.0	A	8.0	A	8.0	A	8.0	
Eastbound	A	8.5	A	8.6	A	8.4	A	8.7	A	7.9	A	8.5	B	10.6	A	9.3	B	8.7	A	9.8	
Overall	F	236.1	F	399.5	F	62.8	F	240.6	C	24.9	F	149.8	F	2273.0	F	601.9	F	435.4	F	1143.0	
Northbound	A	8.7	A	8.9	A	8.4	A	8.7	A	7.9	A	8.5	B	10.6	A	9.3	B	8.7	A	9.8	
Overall	C	31.3	D	36.6	A	6.1	A	6.1	A	6.1	A	6.1	B	14.1	B	14.1	B	14.1	B	14.1	
Northbound	B	16.1	B	17.3	B	16.1	B	16.1	B	16.1	B	16.1	C	32.7	C	32.7	C	32.7	C	32.7	
Southbound	E	75.6	F	91.4	E	91.4	E	91.4	E	91.4	E	91.4	F	222.4	F	222.4	F	222.4	F	222.4	
Eastbound	C	30.4	C	31.0	C	24.2	C	31.1	C	24.3	C	32.4	F	84.0	E	64.7	E	64.3	F	86.9	
Northbound	A	7.5	A	7.2	A	6.8	A	6.9	A	6.7	A	6.9	B	10.8	B	12.0	B	12.1	B	12.2	
Southbound	B	18.3	B	19.5	B	17.8	B	18.3	B	17.5	B	18.5	D	52.5	C	24.8	C	28.7	C	34.8	
Westbound	E	76.4	F	92.6	E	58.3	E	79.9	E	57.8	F	82.9	F	193.4	F	189.5	F	189.5	F	251.1	
Overall	D	37.9	D	40.7	C	29.3	C	32.4	C	27.0	C	40.1	F	179.4	F	133.3	F	146.2	F	157.3	
Northbound	B	14.2	B	12.6	B	12.7	B	12.6	B	12.7	B	12.7	B	15.9	B	16.1	B	16.1	B	16.2	
Southbound	E	60.5	E	62.0	D	40.9	D	46.1	D	36.7	E	60.8	F	328.9	F	255.9	F	275.7	F	289.6	
Eastbound	C	33.6	C	32.0	C	31.6	C	31.9	C	31.2	C	32.0	D	42.5	D	39.7	D	38.0	D	42.5	
Overall	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Northbound	A	8.1	A	8.2	A	8.2	A	8.1	A	8.1	A	8.5	A	8.5	A	9.2	A	9.2	A	10.8	
Southbound	B	14.0	C	17.0	C	17.2	C	17.3	C	17.3	C	24.8	E	42.2	B	17.0	B	17.1	C	20.5	
Westbound	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Overall	A	8.2	A	8.3	A	8.3	A	8.3	A	8.3	B	18.8	C	24.3	C	24.3	C	24.3	C	30.3	
Northbound	A	8.2	A	8.3	A	8.3	A	8.3	A	8.3	B	19.6	C	32.6	C	32.6	C	32.6	C	29.0	
Southbound	C	23.6	D	27.9	D	25.4	C	31.9	C	24.7	C	26.9	A	8.7	B	11.1	B	11.9	B	15.2	
Eastbound	D	42.6	D	48.0	D	25.4	C	31.3	C	24.7	C	26.9	E	79.3	E	23.3	D	22.8	D	49.2	
Overall	A	8.1	A	8.9	A	8.0	A	20.3	C	17.2	A	8.0	C	22.3	C	24.2	A	9.2	B	10.8	
Northbound	A	8.1	A	8.9	A	8.0	A	20.3	C	17.2	A	8.0	C	22.3	C	24.2	A	9.2	B	10.8	
Southbound	B	17.3	B	17.6	D	35.2	D	35.2	D	35.2	D	35.2	B	19.5	C	20.5	B	17.1	C	22.7	
Westbound	F	106.8	F	122.8	F	34.3	F	34.3	F	34.3	F	18.8	E	207.7	C	31.1	B	19.4	C	20.5	
Overall	C	21.1	C	22.7	C	21.1	C	22.6	C	21.1	C	22.0	D	41.4	C	22.0	C	24.4	C	30.3	
Northbound	C	25.1	C	25.9	C	25.9	C	22.6	C	22.6	C	22.0	D	41.4	C	22.0	C	24.4	C	30.3	
Southbound	B	16.7	B	18.8	B	14.4	B	14.4	B	14.4	B	15.0	D	46.1	B	17.0	B	17.0	B	16.2	
Eastbound	C	34.5	C	34.7	C	34.5	C	34.9	C	34.5	C	34.9	D	35.9	C	35.0	D	38.0	D	42.5	
Overall	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Northbound	B	10.6	C	16.8	A	8.0	A	8.0	A	8.0	A	8.5	F	72.7	A	8.4	A	9.2	B	10.8	
Southbound	A	7.6	A	7.9	A	7.9	A	7.9	A	7.9	A	8.3	A	8.3	A	8.3	A	8.3	A	8.3	
Overall	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Northbound	A	8.6	A	8.7	A	8.6	A	8.0	A	8.1	A	8.7	A	9.7	A	9.3	A	8.7	B	10.1	
Eastbound	B	13.0	B	13.9	B	12.3	B	12.4	B	11.3	C	15.4	C	22.2	C	16.1	B	14.4	E	43.5	
Overall	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Northbound	A	8.6	A	8.7	A	8.6	A	8.0	A	8.1	A	8.7	A	9.7	A	9.3	A	8.7	B	10.1	
Eastbound	B	13.0	B	13.9	B	12.3	B	12.4	B	11.3	C	15.4	C	22.2	C	16.1	B	14.4	E	43.5	
Overall	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Northbound	A	8.6	A	8.7	A	8.6	A	8.0	A	8.1	A	8.7	A	9.7	A	9.3	A	8.7	B	10.1	
Eastbound	B	13.0	B	13.9	B	12.3	B	12.4	B	11.3	C	15.4	C	22.2	C	16.1	B	14.4	E	43.5	
Overall	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Northbound	A	8.6	A	8.7	A	8.6	A	8.0	A	8.1	A	8.7	A	9.7	A	9.3	A	8.7	B	10.1	
Eastbound	B	13.0	B	13.9	B	12.3	B	12.4	B	11.3	C	15.4	C	22.2	C	16.1	B	14.4	E	43.5	
Overall	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Northbound	A	8.6	A	8.7	A	8.6	A	8.0	A	8.1	A	8.7	A	9.7	A	9.3	A	8.7	B	10.1	
Eastbound	B	13.0	B	13.9	B	12.3	B	12.4	B	11.3	C	15.4	C	22.2	C	16.1	B	14.4	E	43.5	
Overall	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Northbound	A	8.6	A	8.7	A	8.6	A	8.0	A	8.1	A	8.7	A	9.7	A	9.3	A	8.7	B	10.1	
Eastbound	B	13.0	B	13.9	B	12.3	B	12.4	B	11.3	C	15.4	C	22.2	C	16.1	B	14.4	E	43.5	
Overall	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Northbound	A	8.6	A	8.7	A	8.6	A	8.0	A	8.1	A	8.7	A	9.7	A	9.3	A	8.7	B	10.1	
Eastbound	B	13.0	B	13.9	B	12.3	B	12.4	B	11.3	C	15.4	C	22.2	C	16.1	B	14.4	E	43.5	
Overall	*	*	*</																		

1 A review of Tables 4-38 and 4-39 indicates that in general, compared to No Build conditions,
 2 intersection operations would be expected to improve overall or stay the same in the study area
 3 with the proposed alternatives. When comparing expected LOS and delay conditions at
 4 intersections between the various alternatives, the following greatly influences the results:

- 5 • Diverted traffic from existing routes would result in improved LOS and delay
 6 conditions; however, the more traffic that is diverted, the more volume the alternative
 7 services and increased delay is expected at the intersections along the new route. For
 8 example, Alternatives B/O and P would be expected to service more traffic along the
 9 route and, therefore, delays are estimated to be greater than those along the
 10 Alternative J and Q routes.
- 11 • Proposed improvements at intersections along the route or at the associated
 12 interchange intersections result in better LOS and delay conditions than the expected
 13 No Build conditions. For example, extensive improvements at the Airport Road
 14 interchange for Alternative J indicate significantly improved conditions over the No
 15 Build.
- 16 • Traffic diverting to the alternatives through intersections along other routes may
 17 cause increases in the expected delays, such as at the LA 435/LA 59 at LA 36
 18 roundabout for all alternatives.

19 A comparison of the No Build and Build conditions also indicates improvements may be needed
 20 on existing intersections not on the alternatives whether or not an alternative route is provided.
 21 While the alternatives would be expected to provide improvements in LOS and/or delay on the
 22 congested LA 21 and LA 59 corridors, unacceptable LOS are still expected at many of the
 23 intersections in the design year 2035.

24 Without any geometric or operational improvements proposed, the expected conditions at the LA
 25 21 and LA 36 intersection and at the LA 59 interchange improve most significantly with
 26 Alternatives B/O and P due to the expected significant diversion of traffic from LA 21 and LA
 27 59. This is a result of these alternatives providing access to the western portion of the study area.
 28 Alternatives B/O and P are also expected to decrease delays at the LA 434 interchange without
 29 requiring improvements to the intersections by re-routing trips to the LA 1088 interchange.

30 Alternative Q is expected to improve delay conditions at the LA 434 interchange, but mainly due
 31 to improvements required to handle the additional demand. Similarly, the improvements
 32 predicted by Alternative J at the Airport Road interchange are due to the extensive improvements
 33 proposed.

34 **4.9.3.3 Other Considerations**

35 A roundabout is a road junction in which traffic moves in one direction around a central island.
 36 Roundabouts were considered at the following intersections:

- 37 • Alternative B/O at LA 21
- 38 • Alternative J at LA 36

39 According to *Engineering Directives and Standards Manual* (EDSM) VI.1.1.5, justification and
 40 approval for installing a roundabout require that a study be conducted in which, “comprehensive
 41 investigation and report of traffic conditions and physical characteristics shall be made of the
 42 location.” The appendix to the traffic study in Appendix E provides the initial capacity analyses
 43 with 2035 critical peak volumes for the roundabouts.

1 On January 31, 2011 RPC provided the *I-12 @ Airport Rd Single Point Urban Interchange Stage*
2 *0 Feasibility Study* (Buchart Horn, Inc., 2011). The appendix to the traffic study in Appendix E
3 provides an initial capacity analysis for the signalized approaches of the SPUI concept with 2035
4 critical peak volumes for Alternative J. Although not shown in Tables 4-38 and 4-39, the analysis
5 indicated similar LOS compared to the analyzed recommended intersection geometry and control
6 for Alternative J at the I-12 eastbound and westbound ramps.

7 **4.9.3.4 Summary of Build Alternatives Direct and Indirect Impacts**

8 Direct and indirect impacts to traffic and transportation would be expected to be similar for each
9 of the Build Alternatives as described below. Differences in impacts between alternatives are
10 described in Sections 4.9.3.4.1 through 4.9.3.4.4.

11 The high-speed, controlled access Build Alternatives would be expected to provide travel time
12 savings in comparison to existing routes between I-12 and Bush, which could attract motorists to
13 reroute to the new alignments. As a result, through traffic volumes would be expected to
14 generally decrease on the existing highways, thereby reducing conflict with motorists attempting
15 to access residential and commercial developments from the existing routes. Approximately 70 to
16 85% of the traffic volumes expected for the 2035 Build Alternatives would be expected to use the
17 new routes in 2015. Thus, a majority of traffic is expected to use the Build Alternatives in the
18 implementation year. The remaining 15 to 30% would be expected as a result of the growth
19 between 2015 and 2035.

20 Diverted traffic from existing routes would result in improved LOS and delay conditions;
21 however, the more traffic that is diverted, the more volume the Build Alternative services and
22 increased delay is expected at the intersections along the new route. For example, Alternatives
23 B/O and P would be expected to service more traffic along the route and, therefore, delays are
24 estimated to be greater than those along the Alternative J and Q routes. Proposed improvements at
25 intersections along the route or at the associated interchange intersections result in better LOS and
26 delay conditions than the expected No Build conditions. For example, extensive improvements at
27 the Airport Road interchange for Alternative J indicate significantly improved conditions over the
28 No Build. Traffic diverting to the Build Alternatives through intersections along other routes may
29 cause increases in the expected delays, such as at the LA 435/LA 59 at LA 36 roundabout for all
30 Build Alternatives.

31 The Build Alternatives divided roadway with controlled access is expected to provide greater
32 safety benefits than the existing two-lane undivided highways with numerous access points. A
33 raised median with limited access points decreases the number of conflict points.

34 **4.9.3.4.1 Alternative B/O**

35 Alternative B/O is expected to divert traffic mainly from the southwest portion of LA 21 and
36 from LA 59 due to its location within the study area and connection points to the existing street
37 network.

38 The SELA transportation model estimated that in the design year, Alternative B/O would divert
39 approximately 35% of the daily traffic on LA 21 southwest of its connection, 20% of the daily
40 traffic on LA 59, and 15% of the daily traffic on LA 41 to the new roadway. The 2035 ADTs on
41 these roadways were estimated to be 16,300 vehicles per day (vpd) on LA 21, 25,100 vpd on LA
42 59, and 5,400 vpd on LA 41, resulting in a rough estimation of 11,535 vpd diverted. Both of these
43 routes were identified in the Existing and No Build analysis as capacity constraints. In fact, the
44 areas where the most traffic relief is expected from Alternative B/O are those with the greatest
45 expected congestion. The only exception is Airport Road which is not expected to be significantly
46 impacted by Alternative B/O.

1 The travel time savings expected with Alternative B/O improves compared to existing routes
2 involving LA 21 and LA 59. The greatest savings in travel time is expected versus existing routes
3 between Bush and the I-12 at US 190 and I-12 at LA 434 interchanges at 19.7 and 23.3 minutes
4 per vehicle, respectively. Improvements may be needed on existing intersections not on
5 Alternative B/O whether or not this alternative is constructed. While Alternative B/O is expected
6 to provide improvements in LOS and/or delay on the congested LA 21 and LA 59 corridors,
7 unacceptable LOS are still expected at many of the intersections in the design year 2035.
8 Capacity analysis for the implementation and design years indicates excess capacity at the
9 intersections in the western portion of the project area. How long beneficial effects at
10 intersections on existing routes depend on whether improvements are provided to existing
11 intersections and when the improvements are implemented.

12 Improvements were identified at the LA 1088 interchange to accommodate the added traffic
13 demand with an estimated cost of \$500,000 (see Appendix J) in addition to the cost of
14 constructing the new alignment itself.

15 **4.9.3.4.2 Alternative J**

16 Alternative J is expected to divert traffic mainly from LA 41 with minor diversion of traffic from
17 LA 21 and LA 59, due to its location within the study area and connection points to the existing
18 street network. The majority of the traffic diverted to Alternative J would access I-12 via Airport
19 Road, a corridor with documented congestion problems and existing capacity needs.

20 The SELA transportation model estimated that in the design year, Alternative J would divert
21 approximately 75% of the daily traffic on LA 41, 16% of the daily traffic on LA 21, and 6% of
22 the daily traffic on LA 59 to the new roadway. The 2035 ADTs on these roadways were estimated
23 to be 5,400 vpd on LA 41, 16,300 vpd on LA 21, and 25,100 vpd on LA 59 resulting in a rough
24 estimation of 8,170 vpd diverted. In the Existing and No Build analysis, only intersections
25 inversely affected by the new alignment on LA 41 were identified as capacity constraints.
26 Alternative J is expected to provide improvements in LOS and/or delay on the congested LA 21
27 and LA 59 corridors; however, the reductions in delay are less than that provided by Alternatives
28 B/O and P. For example, Alternative J is expected to provide an approximate 33% reduction in
29 delay for the LA 59 northbound approach in the AM peak at the intersection of LA 21 at LA 59,
30 whereas Alternatives B/O and P would be expected to provide approximately 74% and 81% in
31 reductions, respectively.

32 The area where the most traffic relief is expected is where excess capacity exists on LA 41. The
33 congestion at Airport Road would be expected to worsen or require additional improvements to
34 accommodate the both the existing needs and significant increase in traffic demand as a result of
35 Alternative J.

36 The travel time savings expected with Alternative J improves compared to existing routes
37 involving LA 41. The greatest savings in travel time is expected versus existing routes between
38 Bush and the I-12 at US 11 and I-12 at LA 434 interchanges at 11.4 and 19.8 minutes per vehicle,
39 respectively.

40 Improvements were identified at the Airport Road interchange to accommodate the added traffic
41 demand with an estimated cost of \$23,200,000 (see Appendix J) in addition to the cost of constructing
42 the new alignment itself; most of the improvements are required to relieve existing congestion.

43 **4.9.3.4.3 Alternative P**

44 Alternative P is also expected to divert traffic mainly from LA 21 and from LA 59 due to its
45 location within the study area and connection points to the existing street network.

1 The SELA transportation model estimated that in the design year, Alternative P would divert
2 approximately 40% of the daily traffic on LA 21, 16% of the daily traffic on LA 59, and 46% of
3 the daily traffic on LA 41 to the new roadway. The 2035 ADTs on these roadways were estimated
4 to be 16,300 vpd on LA 21, 25,100 vpd on LA 59, and 5,400 vpd on LA 41, resulting in a rough
5 estimation of 13,020 vpd diverted. Both of these routes were identified in the Existing and No
6 Build analysis as capacity constraints. In fact, Alternative P is expected to provide the most traffic
7 relief to the routes with the greatest expected congestion except Airport Road, which would not
8 be significantly impacted.

9 The travel time savings expected with Alternative P improves compared to existing routes
10 involving LA 21 and LA 59. The greatest savings in travel time is expected versus existing routes
11 between Bush and the I-12 at US 190 and I-12 at LA 434 interchanges at 20.0 and 23.6 minutes
12 per vehicle, respectively. Improvements may be needed on existing intersections not on
13 Alternative P whether or not this alternative is constructed. While Alternative P is expected to
14 provide improvements in LOS and/or delay on the congested LA 21 and LA 59 corridors,
15 unacceptable LOS are still expected at many of the intersections in the design year 2035.
16 Capacity analysis for the implementation and design years indicates excess capacity at the
17 intersections in the western portion of the project area. How long beneficial effects at
18 intersections on existing routes depend on whether improvements are provided to existing
19 intersections and when the improvements are implemented.

20 Improvements were identified at the LA 1088 interchange to accommodate the added traffic
21 demand with an estimated cost of \$600,000 (see Appendix J) in addition to the cost of
22 constructing the new alignment itself.

23 4.9.3.4.4 Alternative Q

24 Alternative Q is also expected to divert traffic mainly from LA 41 and also from both LA 21 and
25 LA 59 due to its location within the study area and connection points to the existing street
26 network.

27 The SELA transportation model estimated that in the design year, Alternative Q would divert
28 approximately 70% of the daily traffic on LA 41, 18% of the daily traffic on LA 21, and 6% of
29 the daily traffic on LA 59 to the new roadway. The 2035 ADTs on these roadways were estimated
30 to be 5,400 vpd on LA 41, 16,300 vpd on LA 21, and 25,100 vpd on LA 59, resulting in a rough
31 estimation of 8,220 vpd diverted. LA 41 was not identified as needing additional capacity, while
32 both LA 21 and LA 59 were. While Alternative Q is expected to provide some improvements in
33 LOS and/or delay on the congested LA 21 and LA 59 corridors, unacceptable LOS are still
34 expected at many of the intersections in the design year 2035. Capacity analysis for the
35 implementation and design years indicates excess capacity at the intersections in the western
36 portion of the project area. How long beneficial effects at intersections on existing routes depend
37 on whether improvements are provided to existing intersections and when the improvements are
38 implemented.

39 The travel time savings expected with Alternative Q improves compared to the existing routes
40 involving LA 41, LA 21 and LA 59. Alternative Q is expected to provide improvements in LOS
41 and/or delay on the congested LA 21 and LA 59 corridors; however, the reductions in delay are
42 less than that provided by Alternatives B/O and P. For example, Alternative Q is expected to
43 provide an approximate 50% reduction in delay for the LA 59 northbound approach in the AM
44 peak at the intersection of LA 21 at LA 59, whereas Alternatives B/O and P would be expected to
45 provide approximately 74% and 81% in reductions, respectively.

46 The greatest savings in travel time is expected versus existing routes between Bush and the I-12
47 at US 190 and I-12 at LA 434 interchanges at 13.2 and 26.6 minutes per vehicle, respectively.

1 Improvements were identified at the LA 434 interchange to accommodate the added traffic
2 demand with an estimated cost of \$400,000 (see Appendix J) in addition to the cost of
3 constructing the new alignment itself.

4 **4.10 UTILITIES**

5 **4.10.1 No Build Alternative**

6 Under the No Build Alternative, construction of the proposed roadway from I-12 to Bush would
7 not be undertaken. Consequently, there would be no direct or indirect impacts to utilities within
8 the ROW, or vicinity of, any of the alternative alignment's corridors.

9 **4.10.2 Build Alternatives**

10 Direct and indirect impacts to utilities would be expected to be similar for each of the Build
11 Alternatives as described below. Sections 4.10.2.1 through 4.10.2.4 describe differences in
12 utilities impacts between alternatives.

13 ***Direct and Indirect Impacts to Utilities***

14 Short-term direct impacts to utilities would be expected under the Build Alternatives. There are
15 multiple utilities located under the alternatives, including major gas and electric transmission
16 lines. No long-term impacts would be expected to utilities. For pipeline crossings, the road profile
17 was raised so that the lines would not have to be relocated. However, electrical transmission lines
18 would have to be relocated for highway construction. After the alignment is constructed, no
19 additional impacts to utilities would be anticipated.

20 Short-term negligible adverse impacts to the majority of the service-oriented facilities, such as
21 water, sewer, and gas, would be anticipated. Existing utility lines within the ROW may be
22 relocated during construction. Relocation may temporarily disrupt water, gas, and
23 telecommunication services during project construction but would be expected to return to pre-
24 existing operating conditions after construction is complete.

25 **4.10.2.1 Alternative B/O**

26 ***Direct and Indirect Impacts to Utilities***

27 Existing electrical, telephone, and cable lines located on overhead poles would be expected to be
28 relocated along the ROW where Alternative B/O would overlap with LA 21 and at each
29 intersection crossing. Substations located in the project area would be avoided. Estimated utility
30 relocation costs for Alternative B/O are \$5 million.

31 **4.10.2.2 Alternative J**

32 ***Direct and Indirect Impacts to Utilities***

33 Existing electrical, telephone, and cable lines located on overhead poles would be expected to be
34 relocated along the ROW where Alternative J would overlap with Airport Road and at each
35 intersection crossing. Substations located in the project area would be avoided. Estimated utility
36 relocation costs for Alternative J are \$6 million.

37 **4.10.2.3 Alternative P**

38 ***Direct and Indirect Impacts to Utilities***

39 Existing electrical, telephone, and cable lines located on overhead poles would be expected to be
40 relocated along the ROW where Alternative P would cross major intersections including LA 36

1 and LA 435. Substations located in the project area would be avoided. Estimated utility relocation
2 costs for Alternative P are \$2 million.

3 **4.10.2.4 Alternative Q**

4 *Direct and Indirect Impacts to Utilities*

5 Existing electrical, telephone, and cable lines located on overhead poles would be expected to be
6 relocated along the ROW where Alternative Q would overlap with LA 434 and at each
7 intersection crossing. Substations located in the project area would be avoided. Estimated utility
8 relocation costs for Alternative Q are \$3 million.

9 **4.11 SOCIOECONOMICS**

10 This section presents the projected baseline values for each of four socioeconomic variables
11 studied: population, employment, regional GDP, and real personal income for a forty-year period,
12 2010 to 2050. Section 3.11 discusses baseline values for those variables.

13 This section also presents the findings of the potential socioeconomic impacts from pre-
14 construction and construction activities of the various alternative alignments for the I-12 to Bush
15 highway project. The construction of a new highway or improvements to existing highways,
16 regardless of the particular alignment selected is expected to have similar socioeconomic impacts.
17 Analysis of the socioeconomic environment in the two-parish ROI considered changes to
18 demography (population) and economic measures (employment, regional GDP, and real personal
19 income). The Community Infrastructure and Public Services subsections below discuss potential
20 changes to community infrastructure (housing) and public services (education, public safety, fire
21 protection and law enforcement, and health care).

22 Appendix F details the *Economic Study Report* prepared as part of the EIS, which is summarized
23 in this section. The report provides information on a parish base, identifies a more specific trend
24 analysis by time-period, and examines potential costs for two phases of the proposed project—
25 pre-construction activities and construction that would be required to implement any of several
26 construction alternatives. Pre-construction activities include project planning and engineering and
27 the acquisition of ROWs. In addition, the effects of current national and regional economic
28 recession¹⁵ have been built in to the forecasted values of all the studied socioeconomic variables.

29 The analysis is based on certain assumptions about the start and end dates of the pre-construction
30 and construction phases of the proposed project and the costs associated with each phase. Those
31 assumptions are:

- 32 33 1. Pre-construction activities (planning, engineering, and ROW acquisition) starts at the
34 beginning of the third quarter (Q3) 2015 (July 1); activities are completed at the end of the
35 fourth quarter (Q4) 2018 (December 31); and total pre-construction costs (excluding any
36 wetland mitigation costs) are about \$35 million (in 2010 dollars), of which \$20.2 million is
37 in acquisition of ROW costs.
- 38 39 2. Construction starts at the beginning of first quarter (Q1) 2019 (January 1); activities are
40 completed by the end of fourth quarter (Q4) 2030 (December 31); and total construction
costs are \$210 million (in 2010 dollars).¹⁶

¹⁵ A recession is a business cycle contraction, a general slowdown in economic activity over a period of time. A recession is characterized as a period of high unemployment rate, a low rate of inflation, and low rate of economic growth.

¹⁶ The estimated start and end dates of both pre-construction and construction and the estimated cost of each phase represent the best information available at the time this report was published. If an Action Alternative is executed on a different time frame or experience different costs than presented in this document, the magnitude and timing could differ.

The analysis of possible indirect or secondary residential, commercial, or industrial development in the ROI resulting from proximity to highway access from the Proposed Action could not be quantified and is unlikely to be computed even with further research.

4.11.1 No Build Alternative

The No Build Alternative would not result in any project-related direct or indirect socioeconomic impacts with respect to population, community infrastructure and/or public services, employment, regional GDP, or real personal income. Baseline values for each of these variables are discussed below.

4.11.1.1 Demography

Population

Population in the socioeconomic ROI would continue to expand under the No Build Alternative from 2010 to 2050. Under the No Build Alternative, however, there would be no project-related increase in population. St. Tammany Parish is expected to experience an annual population growth rate of about 2 percent until 2020. This rate is about twice the expected national increase in population. From 2020 to 2050, the nation would grow at about 0.9% annually, while St. Tammany would likely have a higher population growth rate. St. Tammany Parish is also expected to grow at more than twice the rate of Washington Parish until about 2030. Washington Parish is expected to gain population at a faster rate than the nation until 2015, fall below national rates until 2040, and then grow at a rate equal to or slightly exceeding the national rate of population growth from 2045 to 2050. Table 4-40 presents information about the baseline population in the ROI and the annual change in population, as a percentage.

Table 4-40.
No build alternative - baseline population in the ROI (2010 to 2050)

Population	Baseline Population in ROI								
	2010	2015	2020	2025	2030	2035	2040	2045	2050
ROI	293,841	328,967	360,959	389,899	415,449	438,017	460,036	484,509	512,978
St. Tammany Parish	247,296	279,893	309,769	336,905	360,886	381,821	401,767	423,474	448,478
Washington Parish	46,545	49,074	51,189	52,994	54,562	56,196	58,270	61,035	64,500
	Annual Change in Baseline Population of ROI								
	2010 to 2015	2015 to 2020	2020 to 2025	2025 to 2030	2030 to 2035	2035 to 2040	2040 to 2045	2045 to 2050	
ROI	2.3%	1.9%	1.5%	1.3%	1.1%	1.0%	1.0%	1.1%	
St. Tammany Parish	2.5%	2.0%	1.7%	1.4%	1.1%	1.0%	1.1%	1.1%	
Washington Parish	1.1%	0.8%	0.7%	0.6%	0.6%	0.7%	0.9%	1.1%	
USA	1.0%	1.0%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	

Values may not sum because of rounding.

Source: REMI 2010

Community Infrastructure and Public Services

Project-related impacts to a community's infrastructure and public services are the result of increases in population. There would be no project-related deviations from the projected baseline population values with the No Build alternative. Therefore, there would be no project-related stress on the region's community infrastructure, including its housing inventory, or on its public services, which includes education, law enforcement, fire protection, and health care. Section 3.11 discusses current community infrastructure and public services in the ROI.

4.11.1.2 Economic Measures

Employment, regional GDP, and real personal income are variables that can be used to analyze the economic health of a community. These economic measures in the socioeconomic ROI would continue to expand under the No Build Alternative from 2010 to 2050.

Employment

Baseline employment opportunities in the ROI would continue to expand from 2010 to 2050. Employment comprises estimates of the number of full-time and part-time jobs. There would be no project-related deviations from projected baseline employment values under the No Build Alternative. A phenomenon that should be noted is with rapid increases in baseline population but slower rates of growth in the baseline number of jobs, many residents of the ROI would be expected to accept employment opportunities in surrounding parishes or in a neighboring state.

In particular, Washington Parish is expected to experience a very slow rate of growth in the number of employment opportunities until 2035. The sectors that serve as the Washington Parish employment base - government and government enterprises (particularly state and local government), retail trade, and construction - are not expected to grow as fast as many other sectors (BLS 2009). Working Washington Parish residents are likely to commute to a job site in neighboring parishes or state. The expected increase in the number of jobs is much slower than the rate of increase in parish population until about 2030.

The projected rate of increase in the number of jobs in St. Tammany Parish, until about 2035, is also slower than the corresponding rate of increase in population during that period. However, the expansion of jobs is at a rate markedly higher than the rate of job growth nationally. The sectors that serve as the St. Tammany Parish employment base - professional and business services and the health care and social services - would be expected to be among the industries with the fastest growing employment opportunities. Communities that experience a faster rate of growth in population than in job opportunities are likely to grow as bedroom communities, particularly in this case, for the New Orleans metro area.

Table 4-41 presents information about the baseline line employment in the ROI and the annual change in employment, as a percentage.

Table 4-41.
Baseline employment in the ROI (2010 to 2050)

Baseline Employment in ROI									
Employment	2010	2015	2020	2025	2030	2035	2040	2045	2050
ROI	123,527	131,402	137,340	142,419	148,177	154,611	162,469	172,093	184,006
St. Tammany Parish	106,941	114,685	120,603	125,621	131,095	136,954	143,904	152,385	163,000
Washington Parish	16,587	16,718	16,738	16,798	17,082	17,657	18,565	19,708	21,006
Annual Change in Baseline Employment of ROI									
Employment	2010 to 2015	2015 to 2020	2020 to 2025	2025 to 2030	2030 to 2035	2035 to 2040	2040 to 2045	2045 to 2050	
ROI	1.2%	0.9%	0.7%	0.8%	0.9%	1.0%	1.2%	1.3%	
St. Tammany Parish	1.4%	1.0%	0.8%	0.9%	0.9%	1.0%	1.2%	1.4%	
Washington Parish	0.2%	0.0%	0.1%	0.3%	0.7%	1.0%	1.2%	1.3%	
USA	0.8%	0.6%	0.4%	0.6%	0.8%	0.9%	0.9%	1.0%	

Values may not sum because of rounding.

Source: REMI 2010

GDP

As discussed in Population and Employment sections above, the ROI is expected to experience growth in the applicable baselines in all years from 2010 to 2050. The annual increase in population and annual increase in the number of jobs would result in an annual increase in the regional GDP. There would no project-related impact to GDP under the No Build Alternative because there is no project-related increase in population and no project-related increase in the number of jobs.

GDP can be measured by summing: Consumption (expenditures by households) + Investment (expenditures by businesses) + Government (expenditures by all levels of government) + Net exports (the value of exports – the value of imports). GDP is the value of all final goods and services produced in an area within a given year.

Real Personal Income

Real personal income is income received by persons from all sources. That is, it includes income received as wages, proprietor's income, commissions, bonuses as well as government and business transfer payments (dividends, unemployment compensation, and social security for example). Real personal income per capita is derived by dividing the personal income of a community by the number of persons living in the community.

There would be no project-related change to real personal income, or real personal income per capita under the No Build Alternative because there would be no change in project-related population or employment. Baseline real personal income is expected to increase in the ROI in the period 2010 to 2050.

Real personal income per capita is affected by changes in real personal income and/or changes in population. For example, an increase in PCI could be caused by an increase in real personal

1 income or a decrease in population. In 2010, PCI in the ROI was about \$41,000; it was about
 2 \$43,700 in St. Tammany Parish and about \$26,800 in Washington Parish. The national PCI was
 3 \$39,600 in 2010 (REMI 2010). Until about 2025, the ROI's annual rate of increase in real
 4 personal income per capita is less than the forecasted rate of growth at the national level. This is
 5 because the rate of job growth in the ROI is so much less than the ROI's population rate of
 6 growth.

7 There is a marked difference in the real personal income per capita in St. Tammany Parish and in
 8 Washington Parish. As displayed in Table 4-42, the 2010 per capita income in Washington Parish
 9 is about 61 percent of the per capita income of St. Tammany Parish; the baseline ratio between
 10 the two parishes is expected to narrow slightly over the forty-year study period.

11 Real personal income per capita in St. Tammany Parish, Washington Parish, and the nation is
 12 expected to increase at similar rates from 2015 until 2050. Residents of Washington Parish would
 13 likely experience a faster rate of growth in real personal income between 2010 and 2015 than the
 14 residents of St. Tammany Parish. However, in absolute dollars, the real personal per capita
 15 income in Washington Parish would remain at less than 65 percent of real personal income per
 16 capita in St. Tammany Parish for the entire study period. St. Tammany Parish real personal
 17 income, primarily wages, has been less affected by the current national recession than other areas
 18 because so many jobs are tied to the relatively robust health care, social assistance, professional,
 19 scientific, and technical services industries. In addition in December 2010, the unemployment
 20 rate in St Tammany Parish of 5.2 percent (BLS 2011b) was much smaller than the unemployment
 21 rate in Washington Parish or the national rate unemployment rate of 9.1 percent (BLS 2011a and
 22 BLS 2011b).

23 **Table 4-42.**
 24 **Baseline real personal income per capita in ROI (2010 to 2050)**

Baseline Real Personal Income per Capita in ROI (2010 dollars)									
Real Personal per Capita Income (PCI)	2010	2015	2020	2025	2030	2035	2040	2045	2050
ROI	41,042	43,141	45,434	47,995	51,366	55,595	60,859	67,243	75,347
St. Tammany Parish	43,730	45,697	47,950	50,526	53,978	58,344	63,781	70,410	78,919
Washington Parish	26,764	28,558	30,213	31,906	34,091	36,920	40,714	45,274	50,510
Annual Change in Baseline Real Personal Income per Capita of ROI									
Real Personal per Capita Income (PCI)	2010 to 2015	2015 to 2020	2020 to 2025	2025 to 2030	2030 to 2035	2035 to 2040	2040 to 2045	2045 to 2050	
ROI	1.0%	1.0%	1.1%	1.4%	1.6%	1.8%	2.0%	2.3%	
St. Tammany Parish	0.9%	1.0%	1.1%	1.3%	1.6%	1.8%	2.0%	2.3%	
Washington Parish	1.3%	1.1%	1.1%	1.3%	1.6%	2.0%	2.1%	2.2%	
USA	1.6%	1.4%	1.2%	1.4%	1.6%	1.7%	1.8%	1.9%	

25 Source: REMI 2010
 26

27 **4.11.1.3 Summary of the No Build Alternative**

28 Under the No Build Alternative, the population in the ROI would increase, the number of jobs
 29 would grow, regional GDP would expand, and real personal income would enlarge each year of

1 the 2010 to 2050 study period. However, the growth of those variables is a naturally occurring
2 phenomenon, a projected baseline, and not related to the proposed project. Hence, baseline values
3 for the socioeconomic variables analyzed in this EIS are identical to the value of the variables
4 under the No Build Alternative.

5 **4.11.2 Build Alternatives**

6 The discussion in this section focuses on project-related changes in population, employment,
7 regional Gross Regional Product, and real personal income resulting from the Proposed Action.
8 Changes to the ROI's community infrastructure and public services are also discussed. Changes
9 are the deviations (changes above or below) from a projected baseline for each variable. Baseline
10 values in the ROI for the period 2010 to 2050 for demography (population) and the economic
11 measures (employment, regional GDP, and real personal income) are discussed above in Section
12 4.11.1. The construction of a new highway or improvements to existing highways, regardless of
13 the particular alternative alignment selected, would be expected to have similar socioeconomic
14 impacts. Therefore, the discussion in the following sections applies to all four build alternative
15 alignments.

16 **4.11.2.1 Demography**

17 *Population*

18 Construction of the proposed highway from I-12 to Bush, regardless of the alternative alignment
19 selected, would minimally impact the projected population in the ROI. The very small increases
20 in population would be temporary and of short duration and be unlikely to result in any in-
21 migration of workers or their families.

22 The ROI would experience an increase in population over the naturally occurring baseline
23 population of less than 0.01 percent during pre-construction. A project-related increase in the
24 peak year of change to population during pre-construction, 2018, represents 15 people over the
25 projected regional baseline population of 348,517 people.

26 St. Tammany Parish is expected to absorb virtually all the project-related increase in population
27 during pre-construction. In the peak year of project-related increases in population, 13 of the
28 projected 15 new ROI residents would reside in St. Tammany Parish, with the remaining 2 people
29 expected to live in Washington Parish.

30 It is noted that of the 15 project-related new ROI residents during pre-construction, 3 would be
31 school-aged children (REMI 2010). All the school-age children would be expected to live in St.
32 Tammany Parish. In the 2007–2008 school year, 51,816 children were in public and private
33 educational institutes in the ROI.

34 Table 4-43 details expected projected-related changes in the ROI population during pre-
35 construction, in both absolute numbers and in percentages over the baseline, for the period 2015
36 to 2018, and for reference the year 2010.

37 The economic impact of project-related changes in population is reflected in changes in the
38 regional GDP and in changes to real personal income. Changes to both these variables are
39 discussed below in GDP and Real Personal Income.

40 The ROI would experience an increase over the naturally occurring baseline population of 0.01
41 percent or less during construction. A project-related increase of 0.01 percent, in the peak year of
42 construction, 2030, represents a project-related increase in the ROI of 45 people over the
43 projected baseline population of 415,449. The project-related increase in population in the ROI
44 during construction drops to fewer than 20 people by the year 2036 and to 10 or fewer people by

1 the year 2040. Unlike much larger construction projects, the ROI is not expected to experience a
2 much slower rate of growth in population at the conclusion of construction.

3 St. Tammany Parish is expected to absorb virtually all the project-related increase in population
4 during construction. In the peak year of project-related increases in population, 2030, 39 of the
5 projected 45 new ROI residents would reside in St. Tammany Parish and the remaining 6 people
6 would be expected to reside in Washington Parish.

7
8 **Table 4-43.**
9 **Project-related changes in population in the ROI, pre-construction (2015 to 2018)**

Baseline Population	2010	2015	2016	2017	2018
ROI	293,841	328,967	335,630	342,133	348,517
St. Tammany Parish	247,296	279,893	286,106	292,175	298,137
Washington Parish	46,545	49,074	49,524	49,959	50,380
Build Alternatives Population					
Population	2010	2015	2016	2017	2018
ROI	293,841	328,970	335,637	342,145	348,532
St. Tammany Parish	247,296	279,896	286,112	292,185	298,151
Washington Parish	46,545	49,074	49,525	49,960	50,381
Baseline vs. Build Alternatives, Absolute Change in Population					
Population	2010	2015	2016	2017	2018
ROI	0	3	7	11	15
St. Tammany Parish	0	2	7	10	13
Washington Parish	0	0	1	1	2
Baseline vs. Build Alternatives, Percent Change in Population					
Population	2010	2015	2016	2017	2018
ROI	0.00%	0.00%	0.00%	0.00%	0.00%
St. Tammany Parish	0.00%	0.00%	0.00%	0.00%	0.00%
Washington Parish	0.00%	0.00%	0.00%	0.00%	0.00%

10 Values may not sum because of rounding.

11 Source: REMI 2010

12
13 It is noted that of the 45 project-related new ROI residents, 11 would be school-aged children. Of
14 the 11 school-age children, 10 would be expected to live in St. Tammany Parish and 1 in
15 Washington Parish.

16 Table 4-44 details expected projected-related changes in the ROI population during construction
17 and in the immediate post-construction period, in both absolute numbers and in percentages over
18 the baseline, for the period 2020 to 2045.

19 ***Community Infrastructure and Public Services***

20 Project-related impacts to the community infrastructure and level of public services are driven by
21 project-related changes in population. Project-related related increases in population, during both
22 pre-construction and construction would be about 0.01 percent or less. Therefore, project-related
23 impacts to the region's community infrastructure, including its housing inventory, during re-

1 construction and construction would be virtually undetectable. Project related changes to public
 2 services, including education, law enforcement, fire protection, and health care services would
 3 also be largely insignificant.

4 **Table 4-44.**
 5 **Project-related changes in population in ROI, construction and post-construction**
 6 **(2020 to 2045)**

Base line Population	2020	2025	2030	2035	2040	2045
ROI	360,959	389,899	415,449	438,017	460,036	484,509
St. Tammany Parish	309,769	336,905	360,886	381,821	401,767	423,474
Washington Parish	51,189	52,994	54,562	56,196	58,270	61,035
Build Alternatives Population						
Population	2020	2025	2030	2035	2040	2045
ROI	360,984	389,940	415,493	438,039	460,046	484,513
St. Tammany Parish	309,792	336,941	360,926	381,839	401,775	423,477
Washington Parish	51,192	52,999	54,568	56,200	58,272	61,036
Baseline vs. Build Alternatives, Absolute Change in Population						
Population	2020	2025	2030	2035	2040	2045
ROI	25	40	45	22	10	4
St. Tammany Parish	23	36	39	18	8	3
Washington Parish	3	5	6	3	2	1
Baseline vs. Build Alternatives, Percent Change in Population						
Population	2020	2025	2030	2035	2040	2045
ROI	0.01%	0.01%	0.01%	0.00%	0.00%	0.00%
St. Tammany Parish	0.01%	0.01%	0.01%	0.00%	0.00%	0.00%
Washington Parish	0.01%	0.01%	0.01%	0.01%	0.00%	0.00%

7 Values may not sum because of rounding.

8 Source: REMI 2010

10 **4.11.2.2 Economic Measures**

11 Economic development impacts related to the construction of any of the alternative alignments
 12 would include a temporary increase in direct employment, increase in indirect employment, an
 13 increase the regional per capita income, and an increase in regional GDP. The economic impacts
 14 would be similar for each of the alignments.

15 **Employment**

16 In 2008, about 12,600 persons (BEA 2010b, 2010c) in the ROI were employed in the construction
 17 industry. Construction and maintenance of any of the alternative alignments would require skilled
 18 and unskilled labor. In December 2010, the unemployment rate in St. Tammany Parish was 5.2
 19 percent and 9.1 percent in Washington Parish (BLS 2011b). The size of the region's construction
 20 labor pool and unemployment rate suggest that there would be no short-term labor shortages
 21 during the construction regardless of the alternative selected. Therefore, no regional in-migration
 22 of workers or their families would be expected.

1 Construction and roadway improvements would result in an increase in regional employment
 2 opportunities. However, pre-construction activities and construction of the proposed highway
 3 between I-12 and Bush, regardless of the alternative alignment selected, would have a very small
 4 impact on employment in the ROI, even during the construction period itself.

5 As Table 4-45 shows, in the peak years of employment during pre-construction, 2016 and 2017,
 6 the number of jobs in the ROI would increase by 103 positions because of construction related
 7 activities. Those additional positions represent about 0.08 percent of the baseline ROI
 8 employment in that year. Virtually all the jobs, 102 or 99 percent, would be created in St.
 9 Tammany Parish. Project-related jobs include positions created as a direct and indirect result of
 10 pre-construction activities (planning and engineering), and induced effects (resulting from the
 11 spending of monies received for land acquired ROWs).

12 **Table 4-45.**
 13 **Project-related changes in employment in ROI, pre-construction (2015 to 2018)**

Baseline Population	2010	2015	2016	2017	2018
ROI	123,527	131,402	132,728	133,891	135,190
St. Tammany Parish	106,941	114,685	116,007	117,173	118,454
Washington Parish	16,587	16,718	16,721	16,718	16,735
Build Alternatives Population					
Population	2010	2015	2016	2017	2018
ROI	123,527	131,454	132,832	133,994	135,291
St. Tammany Parish	106,941	114,736	116,110	117,275	118,554
Washington Parish	16,587	16,718	16,722	16,719	16,736
Baseline vs. Build Alternatives, Absolute Change in Population					
Population	2010	2015	2016	2017	2018
ROI	0	52	103	103	101
St. Tammany Parish	0	52	102	102	100
Washington Parish	0	0	1	1	1
Baseline vs. Build Alternatives, Percent Change in Population					
Population	2010	2015	2016	2017	2018
ROI	0.00%	0.04%	0.08%	0.08%	0.07%
St. Tammany Parish	0.00%	0.04%	0.09%	0.09%	0.08%
Washington Parish	0.00%	0.00%	0.01%	0.01%	0.01%

14 Values may not sum because of rounding.

15 Source: REMI 2010

16
 17 The economic impact of project-related changes in employment during pre-construction is
 18 reflected in changes in the regional GDP and in changes to real personal income. Changes to both
 19 of those variables are discussed below in *GDP* and *Real Personal Income*.

20 Table 4-46 displays information about the creation of project-related positions during the
 21 construction and in the immediate post-construction period. In all years during construction and
 22 in the 20 years post construction, changes in employment levels in the ROI and in the parishes

1 **Table 4-46.**
 2 **Project-related changes in employment in ROI, construction and post-construction**
 3 **(2020 to 2045)**

Baseline Population	2020	2025	2030	2035	2040	2045
ROI	137,340	142,419	148,177	154,611	162,469	172,093
St. Tammany Parish	120,603	125,621	131,095	136,954	143,904	152,385
Washington Parish	16,738	16,798	17,082	17,657	18,565	19,708
Build Alternatives Employment						
Population	2020	2025	2030	2035	2040	2045
ROI	137,493	142,552	148,295	154,594	162,461	172,089
St. Tammany Parish	120,754	125,753	131,212	136,937	143,895	152,381
Washington Parish	16,739	16,800	17,083	17,657	18,565	19,708
Baseline vs. Build Alternatives, Absolute Change in Employment						
Population	2020	2025	2030	2035	2040	2045
ROI	153	133	118	-17	-9	-4
St. Tammany Parish	151	132	117	-17	-9	-4
Washington Parish	2	1	1	0	0	0
Baseline vs. Build Alternatives, Percent Change in Employment						
Population	2020	2025	2030	2035	2040	2045
ROI	0.11%	0.09%	0.08%	-0.01%	-0.01%	0.00%
St. Tammany Parish	0.13%	0.10%	0.09%	-0.01%	-0.01%	0.00%
Washington Parish	0.01%	0.01%	0.01%	0.00%	0.00%	0.00%

4 Values may not sum because of rounding.

5 Source: REMI 2010

6
 7 individually represent less than 0.14 percent of the baseline employment. Note that the loss of
 8 positions in the post 2031 period represents a slower rate of growth in new positions in the ROI
 9 rather than an absolute loss of positions (see Table 4-41 baseline employment).

10 The economic impact of project-related changes in employment during construction is reflected
 11 in changes in the regional GDP and in changes to real personal income. Changes to of both those
 12 variables are discussed below in *GDP* and *Real Personal Income*.

13 ***GDP***

14 Noting project-related changes in the region's GDP are a helpful way to assess the economic
 15 impact of a project. Project-related impacts to GDP would occur primarily during construction
 16 activities. Changes in GDP occur with changes in productivity and spending. New jobs create
 17 wages that are spent (increasing consumption expenditures) and taxes paid (increasing
 18 government expenditures). The increased spending of wages also results in additional business
 19 spending (increasing Investment as commercial entities expand offerings to meet the demands of
 20 consumers). Intermediate goods purchased for construction activities also increase Investment.

21 Pre-construction activities associated with the proposed project, regardless of the alternative
 22 alignment selected, would cause a small increase over the baseline GDP. As shown in Table 4-47,

Table 4-47.
Project-related changes in regional GDP in ROI, pre-construction (2015 to 2018)

Baseline GDP	2010	2015	2016	2017	2018
ROI	6.61	7.77	8.01	8.23	8.47
St. Tammany Parish	5.91	6.99	7.21	7.42	7.65
Washington Parish	0.70	0.78	0.79	0.81	0.83
Build Alternatives					
GDP	2010	2015	2016	2017	2018
ROI	6.61	7.77	8.01	8.24	8.48
St. Tammany Parish	5.91	6.99	7.22	7.43	7.65
Washington Parish	0.70	0.78	0.79	0.81	0.83
Baseline vs. Build Alternatives, Absolute Change in GDP					
GDP	2010	2015	2016	2017	2018
ROI	0.0000	0.0024	0.0049	0.0049	0.0049
St. Tammany Parish	0.0000	0.0024	0.0049	0.0049	0.0049
Washington Parish	0.0000	0.0000	0.0000	0.0000	0.0000
Baseline vs. Build Alternatives, Percent Change in GDP					
GDP	2010	2015	2016	2017	2018
ROI	0.00%	0.03%	0.06%	0.06%	0.06%
St. Tammany Parish	0.00%	0.04%	0.07%	0.07%	0.06%
Washington Parish	0.00%	0.00%	0.00%	0.00%	0.00%

Values may not sum because of rounding.

¹ Dollar values expressed in billions of 2010 fixed (not adjusted of inflation) dollars.

Source: REMI 2010

the changes would occur in years 2015 to 2018. The increase over in the baseline is 0.06 percent or less in the ROI. Changes to GDP in the ROI would peak at 0.06 percent 2016, 2017, and 2018.

The economic impact of project-related changes during both pre-construction and construction to the applicable baseline of GDP is generally positive, but very small. In the peak year of project-related changes to regional GDP during construction, 2019, regional GDP would be expected to increase by \$9 million or less than 0.1 percent. The increase in the region's GDP during construction would be an annual average of about \$7.0 million. Table 4-48 summarizes project-related changes during construction and in the immediate post-construction period.

A very small slowing in the rate of growth in GDP in the ROI would be expected because of a reduction in project-related activities in the period 2031 to 2039. The slower growth rate amounts to about 0.01 percent. The slower rate of growth in regional GDP from project-related activities during that period amounts to about an annual average of \$1.2 million. Those increases over the baseline regional GDP values from 2015 to 2030 and the slowing from 2031 to 2039 are not meaningful because they are a small percentage of the region's GDP. The economic impact from project-related activities to GDP in St. Tammany and Washington Parish would be negligible.

Table 4-48.
Project-related changes in regional GDP in ROI, construction (2020 to 2045)

Baseline GDP	2020	2025	2030	2035	2040	2045
ROI	8.96	10.30	11.92	13.84	16.21	19.17
St. Tammany Parish	8.10	9.35	10.83	12.59	14.75	17.44
Washington Parish	0.86	0.96	1.08	1.25	1.46	1.73
Build Alternatives						
GDP	2020	2025	2030	2035	2040	2045
ROI	8.97	10.31	11.92	13.84	16.21	19.17
St. Tammany Parish	8.11	9.35	10.84	12.59	14.75	17.44
Washington Parish	0.86	0.96	1.08	1.25	1.46	1.73
Baseline vs. Build Alternatives, Absolute Change in GDP						
GDP	2020	2025	2030	2035	2040	2045
ROI	0.0073	0.0073	0.0061	-0.0012	0.0000	-0.0012
St. Tammany Parish	0.0073	0.0073	0.0061	-0.0012	0.0000	0.0000
Washington Parish	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Baseline vs. Build Alternatives, Percent Change in GDP						
GDP	2020	2025	2030	2035	2040	2045
ROI	0.09%	0.07%	0.06%	-0.01%	0.00%	0.00%
St. Tammany Parish	0.09%	0.08%	0.06%	-0.01%	0.00%	0.00%
Washington Parish	0.01%	0.01%	0.01%	0.00%	0.00%	0.00%

Values may not sum because of rounding.

¹ Dollar value expressed in billions of fixed (not adjusted for inflation) 2010 dollars.

Source: REMI 2010

Real Personal Income

Project-related activities during pre-construction and construction would have very little economic impact on the real personal income per capita of ROI residents. In the peak year of project-related impacts during either pre-construction or construction, 2019, residents in the ROI would see PCI improve by about \$17, or about four-hundredths of one percent (0.04 percent). The small changes, increases above the baseline, are most evident in the construction period. In the immediate post-construction period, there would be a very small slowing of growth in the real personal income per capita, less than \$5 per year, until about 2043. Table 4-49 displays information about changes to regional real personal per capita during pre-construction, and for comparison, in 2010. Table 4-50 presents information about changes to PCI during construction, and immediate post-construction periods.

1 **Table 4-49.**
 2 **Project-related changes in real personal per capita income in ROI, pre-construction**
 3 **(2015 to 2018)**

Baseline Real Personal Per Capita Income (in dollars)	2010	2015	2016	2017	2018
ROI	41,042	43,141	43,622	44,055	44,553
St. Tammany Parish	43,730	45,697	46,163	46,583	47,080
Washington Parish	26,764	28,558	28,940	29,268	29,606
Build Alternatives					
Real Personal Per Capita Income (in dollars)	2010	2015	2016	2017	2018
ROI	41,042	43,148	43,634	44,066	44,564
St. Tammany Parish	43,730	45,704	46,177	46,596	47,092
Washington Parish	26,764	28,559	28,941	29,269	29,607
Baseline vs. Build Alternatives, Absolute Change in PCI					
Real Personal Per Capita Income (in dollars)	2010	2015	2016	2017	2018
ROI	0	6	12	11	11
St. Tammany Parish	0	7	13	13	12
Washington Parish	0	1	1	1	1
Baseline vs. Build Alternatives, Percent Change in PCI					
Real Personal Per Capita Income	2010	2015	2016	2017	2018
ROI	0.00%	0.01%	0.03%	0.03%	0.02%
St. Tammany Parish	0.00%	0.02%	0.03%	0.03%	0.03%
Washington Parish	0.00%	0.00%	0.00%	0.00%	0.00%

4 Values may not sum because of rounding.

5 ¹ Dollar values are expressed in fixed (not adjusted for inflation) 2010 dollars.

6 Source: REMI 2010

7
 8
 9
 10 *The remainder of this page intentionally left blank.*

Table 4-50.
Project-related changes in real personal per capita income in ROI, construction
(2020 to 2045)

Baseline Real Personal Per Capita Income (in dollars)	2020	2025	2030	2035	2040	2045
ROI	45,434	47,995	51,366	55,595	60,859	67,243
St. Tammany Parish	47,950	50,526	53,978	58,344	63,781	70,410
Washington Parish	30,213	31,906	34,091	36,920	40,714	45,274
Build Alternatives						
Real Personal Per Capita Income (in dollars)	2020	2025	2030	2035	2040	2045
ROI	45,450	48,008	51,377	55,591	60,857	67,243
St. Tammany Parish	47,968	50,541	53,990	58,339	63,779	70,410
Washington Parish	30,216	31,907	34,091	36,919	40,712	45,274
Baseline vs. Build Alternatives, Absolute Change in PCI						
Real Personal Per Capita Income (in dollars)	2020	2025	2030	2035	2040	2045
ROI	16	13	11	-4	-1	0
St. Tammany Parish	18	15	12	-5	-1	0
Washington Parish	2	1	0	-1	-1	0
Baseline vs. Build Alternatives, Percent Change in PCI						
Real Personal Per Capita Income	2020	2025	2030	2035	2040	2045
ROI	0.04%	0.03%	0.02%	-0.01%	0.00%	0.00%
St. Tammany Parish	0.04%	0.03%	0.02%	-0.01%	0.00%	0.00%
Washington Parish	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%

Values may not sum because of rounding.

¹ Dollar values are expressed in fixed (not adjusted for inflation) 2010 dollars.

Source: REMI 2010

4.11.3 Summary of Build Alternatives

St. Tammany Parish dominates the two-parish ROI in terms of the four analyzed socioeconomic variables: population, number of jobs (employment), the regional GDP, and real personal income. In 2010, before beginning pre-construction activities or construction start of any of the alternatives for the proposed project, St. Tammany Parish housed 84 percent of the population, provided 87 percent of the jobs, and generated 89 percent of the region's GDP. In 2010 the real personal income per capita in St. Tammany Parish is estimated to be about 163 percent of the real personal income per capita in Washington Parish. Most of the project-related changes to those socioeconomic variables would be expected in St. Tammany Parish.

In the peak year of project-related impacts, 2030 for changes in population and 2019 for changes in employment, regional GDP, and real personal income, St. Tammany Parish would host 39 of the 45 (about 87 percent) of the new project-related residents in the ROI and provide 154 of the 155 new project-related jobs (about 99 percent). Project-related effects on the GDP would be nearly undetectable in Washington Parish but represent an increase of \$7.3 million over the baseline in St. Tammany Parish in 2019. Residents of St. Tammany Parish could experience an increase of \$19 in their real personal income while residents of Washington Parish could see a

1 project-related increase of \$2 in their real personal income per capita. Therefore, absolute
2 changes and changes as a percentage over/under the baseline values for those socioeconomic
3 variables in St. Tammany Parish broadly reflect the changes to the study area, the ROI.

4 Regardless of the alternative alignment selected, the economic impact of project-related activities
5 would be expected to be very small. In all years 2010 to 2050 and in the ROI as a whole and in
6 St. Tammany and Washington parishes individually, the project-related impacts, the annual
7 changes over/under the applicable baselines, would be less than 0.14 percent. In Washington
8 Parish, the project-related changes to each of the four analyzed socioeconomic variables during
9 the applicable peak year (the year when changes reflect the greatest magnitude) would be less
10 than two one-hundredths of one percent (less than 0.02 percent). In St. Tammany Parish,
11 maximum changes to population would be about 0.01 percent, to GDP about 0.1 percent, and to
12 PCI about 0.04 percent. Changes to employment would be about 0.13 percent. At construction
13 completion, the ROI socioeconomic variables would continue to grow, but at a very slightly (0.01
14 percent) slower rate for about 10 years (until about 2040).

15 The economic impact in the ROI of the proposed project to the regional population, employment,
16 GDP, and real personal income is positive, but not statistically significant. Differences in
17 community infrastructure impacted by the Build Alternatives are discussed in Sections 4.11.3.1 to
18 4.11.3.4.

19 **4.11.3.1 Alternative B/O**

20 Under Alternative B/O, existing development in the proposed ROW would be relocated or
21 removed. An estimated 14 families would be displaced and all are owner-occupants. Five
22 businesses would also be displaced including: three service stations, one Dollar General store,
23 and one insurance company. Those businesses and home owners would be required to be
24 relocated. Fifth Ward Jr. High School would qualify for functional replacement. Twelve
25 classrooms, a gymnasium, and the administrative offices would be directly impacted and would
26 take approximately two years to replace (C.H. Fenstermaker 2011). The Functional Replacement
27 Program allows for publicly owned and publicly used facilities to be replaced with a functionally
28 new or existing facility (C.H. Fenstermaker 2011).

29 **4.11.3.2 Alternative J**

30 Under Alternative J, existing development in the proposed ROW would be relocated or removed.
31 Construction of Alternative J would displace an estimated 51 families. Of these families, 26 are
32 owner-occupants and 25 are apartment tenants. Fifteen families occupy mobile homes which are
33 considered movable, but owner occupied. Approximately 14 businesses would also be displaced
34 (C.H. Fenstermaker 2011).

35 The Slidell Head-start building would be impacted under Alternative J. The building appears to
36 be publicly owned and used by the public, therefore it would qualify for functional replacement.
37 The Functional Replacement Program allows for publicly owned and publicly used facilities to be
38 replaced with a functionally new or existing facility (C.H. Fenstermaker 2011).

39 **4.11.3.3 Alternative P**

40 Under Alternative P, existing development in the proposed ROW would be relocated or removed
41 and would displace approximately six families. Two of the six families occupy mobile homes and
42 only replacement sites would be required. No businesses or facilities would be expected to be
43 displaced (C.H. Fenstermaker 2011).

1 **4.11.3.4 Alternative Q**

2 Under Alternative Q, existing development in the proposed right-of-way would displace
3 approximately 19 families. Of those 19 families, 15 occupy mobile homes and replacement sites
4 for those homes would be required (C.H. Fenstermaker 2011).

5 **4.12 ENVIRONMENTAL JUSTICE**

6 EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income*
7 *Populations* is designed to focus the attention of federal agencies on human health and
8 environmental conditions in minority communities and low-income communities. Environmental
9 justice analyses are performed to identify potential disproportionately high and adverse effects on
10 minority communities or to low-income communities from proposed actions and to identify
11 alternatives that might mitigate those impacts.

12 Population data from the 2000 Census, specifically census tract data from those census tracts in
13 St. Tammany and Washington Parish, were used for this analysis.¹⁷ Racial minority populations
14 included in the 2000 Census are identified as Black or African American, American Indian and
15 Alaska Native, Asian, Native Hawaiian and other Pacific Islander, and Other. Ethnic minority
16 populations include persons of Hispanic or Latino origin. Persons of Hispanic or Latino origin
17 may be of any race, and are also included in applicable racial classifications. Poverty status, used
18 in this EIS to define low-income status, is reported as the percentage of persons with a family unit
19 income below the poverty level. This analysis was performed prior to the availability of the 2010
20 census data; however, no meaningful changes in the rates of minorities, nor persons living in
21 poverty, nor in the residential location of those populations has occurred since the 2000 census.
22 Use of the 2010 census tract data would not alter the conclusions reached here based on the 2000
23 census tract data.

24 The 2000 Census defines the poverty level as an annual income of \$8,794 or less for an
25 individual, and an annual income of \$17,603 or less for a family unit of four persons (USCB
26 2000b). Concentrations of minority or lower income populations were those geographical areas
27 (census tracts) where the number of minority or low income persons exceeds 50 percent or the
28 minority population percentage of the affected area is meaningfully greater than the minority
29 population percentage in the general population of other appropriate unit of geographic areas, in
30 this case Louisiana. Tables 3-65, 3-66, and 3-67 in Section 3.11 provide detailed information
31 about the percentages of minority persons and low-income persons in Louisiana and each of the
32 census tracts in St. Tammany and Washington Parishes. Two census tracts are in St. Tammany
33 Parish with concentrations of minorities, expressed as a percentage of the total parish population,
34 that is meaningfully greater than the percentage of minorities in Louisiana, census tracts 405.01
35 (Covington) and 409 (NE of Slidell). Two census tracts are in Washington Parish with
36 concentrations of minorities at a rate that exceeds 50 percent of the total parish population, census
37 tract 9503 (North of Franklinton) and census tract 9508 (Bogalusa). One census tract exists with a
38 meaningful greater rate of minorities than in Louisiana, census tract 9509 (Bogalusa). Two census
39 tracts are in St. Tammany Parish that have a rate of poverty meaningfully greater than that in
40 Louisiana, census tract 405.01 and 411.03 (NW of Slidell). Three census tracts in Washington
41 Parish have a rate of poverty meaningfully greater than that in Louisiana, census tracts 9503,
42 9508, and 9509 (Bogalusa). Project-related socioeconomic and other environmental impacts

¹⁷ Census Tracts are small, statistical subdivisions of a county or equivalent entity. Census tracts generally have a population size between 1,200 and 8,000 people. The spatial size of census tracts varies widely depending on the density of settlement.

1 would be expected to be very small; therefore, no high and adverse effects on minority
2 populations or low-income populations would be expected.

3 As shown in Table 3-65, each parish individually, had a lower percentage of racial minority
4 residents than Louisiana. In 2000, St. Tammany Parish had a slightly higher percentage of
5 persons of Hispanic or Latino origin than Louisiana. Persons of Hispanic or Latino origin
6 represented a smaller percentage of the Washington Parish population than persons of Hispanic or
7 Latino origin in the state.

8 In 2000, approximately 12.4 percent of the residents of the ROI were living in poverty compared
9 to a rate of 19.6 percent in Louisiana that year. In 2000, 9.7 percent of St. Tammany Parish
10 residents were living in poverty and 24.7 percent of the residents of Washington Parish were
11 classified as living in poverty.

12 No disproportionately high and adverse health or environmental impacts to racial or ethnic
13 minorities or to low-income populations would be expected from the No Build Alternative or
14 from any of the four Action Alternative alignments analyzed in this EIS.

15 **4.12.1 No Build Alternative**

16 There are no environmental justice impacts to any population under the No Build Alternative.

17 **4.12.2 Build Alternatives**

18 The socioeconomic and other environmental impacts during pre-construction and construction,
19 regardless of the alternative alignment selected, are similar, small, and generally beneficial in that
20 temporary and permanent jobs would be created. There are no adverse environmental justice
21 impacts expected during the pre-construction or construction period to any population. There are
22 no adverse socioeconomic or other environmental justice impacts expected during the post
23 construction period. There are no high and adverse environmental justice impacts expected during
24 the pre-construction, construction, or post-construction period to any population. Minority
25 populations and low-income populations could benefit from the project-related economic
26 development because of increases in employment opportunities, the improved real personal
27 income, and the growth in regional GDP.

28 **4.13 CHILDREN'S ENVIRONMENTAL HEALTH AND SAFETY RISKS**

29 **4.13.1 No Build Alternative**

30 No adverse impacts on the health and safety of the children would be expected in the ROI under
31 the No Build Alternative. The No Build Alternative would not change the current status of
32 children in the region, hence, children's health and safety in the region would not be affected.

33 **4.13.2 Build Alternatives**

34 Project-related changes to the ROI population, regardless of the Build Alternative selected,
35 include children (aged 0 – 19 years). During the peak year of pre-construction activities, the
36 estimated project-induced change in population of 15 persons includes 5 children (aged 0–19
37 years). During the peak period of impacts during construction activity, 2030, about 45 project-
38 related new residents would migrate to the region. Approximately 15 of those residents would be
39 children.

40 **4.13.2.1 Alternative B/O**

41 One existing public school, Fifth Ward Junior High School, with an enrollment of 531 students in
42 2008/09 school year (NCES undated) is within the 250-ft ROW Alternative B/O. There are no

1 plans to relocate the school should this alternative be selected. Should this alternative be selected,
2 short-term minor adverse impacts on the protection of children would be expected. Because
3 construction sites could be enticing to children, construction activity could pose an increased
4 safety risk. During construction, the safety measures stated in 29 CFR Part 1926, *Safety and*
5 *Health Regulations for Construction*, would be followed to protect the health and safety of the
6 children and other nearby residents and construction workers. For example, barriers and “No
7 Trespassing” signs could be placed around construction sites to deter children from playing in the
8 areas and that construction vehicles and equipment be secured when not in use. In addition,
9 permanent, appropriate safety devices/measures could be installed and implemented to mitigate
10 the risks associated with the expected increase in vehicle traffic volume.

11 **4.13.2.2 Alternative J**

12 No adverse environmental consequences would be expected for the health and safety of the
13 children in the region under the Alternative J.

14 **4.13.2.3 Alternative P**

15 No adverse environmental consequences would be expected for the health and safety of the
16 children in the region under the Alternative.

17 **4.13.2.4 Alternative Q**

18 No adverse environmental consequences would be expected for the health and safety of the
19 children in the region under the Alternative Q.

20 **4.13.3 Summary of Impacts to Children’s Health and Safety**

21 The potential environmental health impacts and safety risks from pre-construction activities, the
22 construction, and operation of three (Alternatives J, P, and Q) of the four Alternatives would not
23 be expected to disproportionately affect children. No significant environmental health and safety
24 impacts would be expected on any population identified in this document.

25 Alternative B/O could affect the health and safety of children in the vicinity of Fifth Ward Junior
26 High School. Appropriate measures to mitigate health and safety risks to children would be
27 undertaken if this alternative alignment is selected.

28 **4.14 AESTHETIC AND VISUAL RESOURCES**

29 **4.14.1 No Build Alternative**

30 Under the No Build Alternative, construction of the proposed roadway from I-12 to Bush would
31 not be undertaken. Consequently, there would be no direct or indirect impacts to aesthetic and
32 visual resources within the ROW, or vicinity of, any of the alternative alignment’s corridors.

33 **4.14.2 Build Alternatives**

34 Direct and indirect impacts to aesthetic and visual resources would be expected to be similar for
35 each of the Build Alternatives as described below.

36 ***Direct Impacts to Aesthetics and Visual Resources***

37 Short-term direct minor adverse impacts would be experienced during construction. The clearing
38 of land and the use and storage of construction equipment on site could temporarily decrease the
39 aesthetic and visual value of the project area. The areas outside of the ROW would be allowed to
40 return to their natural condition after project construction is complete.

1 Short-term direct minor adverse impacts during construction could affect aesthetics and visual
2 resources in the vicinity of this alternative with erosion and sedimentation of receiving streams.
3 During construction of the alternative, erosion from construction activities would likely increase
4 turbidity in receiving streams, degrading the visual appeal of waterways in the project area. An
5 LPDES General Construction Permit is required for all construction activities, and BMPs would
6 be employed to minimize erosion and sedimentation or silting of receiving streams.

7 *Indirect Impacts to Aesthetics and Visual Resources*

8 Long-term indirect moderate adverse impacts could be expected to reduce the overall rural
9 atmosphere of the communities along any of the proposed alignments as more traffic is
10 introduced in the project area.

11 **4.15 CULTURAL RESOURCES**

12 A Phase I cultural resources survey was conducted for each alternative alignment between April
13 and October 2010. A previous cultural resources investigation associated with EA for this project
14 was completed and combined with the most current survey. The results of the survey and
15 potential impacts are discussed below.

16 **4.15.1 No Build Alternative**

17 *Direct and Indirect Impacts to Cultural Resources*

18 Under the No Build Alternative, construction of the proposed roadway from I-12 to Bush would
19 not be undertaken. Consequently, there would be no direct or indirect impacts to cultural
20 resources within the ROW, or vicinity of, any of the alternative alignment's corridors.

21 **4.15.2 Build Alternatives**

22 **4.15.2.1 Alternative B/O**

23 *Direct and Indirect Impacts to Cultural Resources*

24 Under this alternative, cultural resources would not be directly or indirectly impacted. No
25 archaeological sites were recorded during the survey of Alternative B/O. A total of 12 standing
26 structures are located adjacent to this alternative; however, none of the structures are considered
27 eligible for nomination to the NRHP.

28 If any archaeological cultural resources are encountered during project activities, work would
29 cease and the SHPO would be consulted immediately.

30 **4.15.2.2 Alternative J**

31 *Direct and Indirect Impacts to Cultural Resources*

32 Under this alternative, cultural resources would not be directly or indirectly impacted. One site,
33 an old railroad alignment of the New Orleans Great Northern Railroad and 9 standing structures
34 were documented during site investigations. None of these are considered eligible for nomination
35 to the NRHP.

36 No indirect impacts to cultural resources would be expected. If any archaeological cultural
37 resources are encountered during project activities, work would cease, and the SHPO would be
38 consulted immediately.

4.15.2.3 *Alternative P*

Direct and Indirect Impacts to Cultural Resources

Direct adverse impacts could occur under this alternative. Four new archaeological sites were recorded during the survey of the alternative. Of the four recorded sites, one is the historic alignment of the New Orleans Great Northern Railroad that extends through a portion of Alternative P. The railway was abandoned in the late-20th century, and within the surveyed alternatives, majority of the railroad has been destroyed. Most of the alignment is now used as a logging road. None of the newly recorded sites is considered eligible for nomination to the NRHP.

The previously recorded Gum Swamp site is within this alternative. The site is eligible for nomination to the NRHP and should be avoided during all phases of highway construction. If this site cannot be avoided, archaeological mitigation should be undertaken.

Seven standing structures are located adjacent to Alternative P. None of these structures is considered eligible for nomination to the NRHP; however, construction of Alternative P would adversely affect one historic resource.

No indirect impacts to cultural resources would be expected. If any archaeological cultural resources are encountered during project activities, work would cease, and the SHPO would be consulted immediately.

4.15.2.4 *Alternative Q*

Direct and Indirect Impacts to Cultural Resources

Direct and indirect impacts would not be expected to cultural resources under this alternative. The only site identified affected by this alignment is the New Orleans Great Northern Railroad. The railway was abandoned in the late-twentieth century, and within the surveyed alternatives, majority of the railroad has been destroyed and most of the alignment is now used as a logging road. Additionally, nine standing structures greater than 50 years of age were identified along Alternative Q. None of the newly recorded sites is considered eligible for nomination to the NRHP.

If any archaeological cultural resources are encountered during project activities, work would cease and the SHPO would be consulted immediately.

4.16 **HAZARDOUS AND TOXIC SUBSTANCES AND POLLUTION**

4.16.1 *No Build Alternative*

Direct and Indirect Impacts from Hazardous and Toxic Substances and Pollution

Under the No Build Alternative, construction of the proposed roadway from I-12 to Bush would not be undertaken. Consequently, there would be no direct or indirect impacts on this resource area in the ROW or vicinity of any of the alternative alignment's corridors.

4.16.2 *Build Alternatives*

Direct Impacts from Hazardous and Toxic Substances and Pollution

Short-term minor adverse impacts would be expected from hazardous materials used and wastes generated during construction under this alternative. The use of these materials and generated wastes could create a potential for hazardous spills. Construction contractors would be required to

1 comply with all local, state, and federal regulations pertaining to the handling and management of
2 hazardous materials waste.

3 Additionally, construction, ground clearing, leveling, and excavation could reveal hazardous
4 materials stored in underground storage tanks or reveal historic spills. If such conditions are
5 discovered during construction, construction contractors should take appropriate measures to
6 remediate the area and remove any existing soil, surface water, or groundwater contamination in
7 accordance with state and federal environmental regulations. If an alternative alignment is
8 selected, a new Phase I ESA would need to be prepared to determine the environmental
9 conditions. If environmentally affected areas are identified, appropriate measures would be
10 implemented before construction.

11 Homes and buildings that would be acquired as part of the ROW could be demolished and could
12 generate short-term minor adverse impacts. The contract should investigate each building for the
13 presence of asbestos siding and lead-based paint and ensure that demolition and debris disposal is
14 conducted in accordance with state and federal regulations. Notification to EPA is required under
15 40 CFR 60.145, *Standard for Demolition and Renovation*.

16 ***Indirect Impacts from Hazardous and Toxic Substances and Pollution***

17 Long-term indirect minor adverse impacts on the environment from hazardous and toxic
18 substances and pollution are possible. Commercial vehicles can transport hazardous materials and
19 fuel, hazardous, and toxic spills might occur. Any hazardous spill must be reported in accordance
20 with 49 CFR 171.15. Each hazardous waste transporter is required to develop a spill contingency
21 plan in accordance with 33 Louisiana Administrative Code (LAC) section 1315.

22 **4.17 SUMMARY OF CONSEQUENCES**

23 A summary of the potential environmental and socioeconomic consequences of the No Build
24 Alternative and Preferred Alternative are presented in Table 4-51.

25 **4.18 CUMULATIVE IMPACTS**

26 To define cumulative impacts, it is necessary to determine the appropriate scope of analysis for
27 the project. The determination of scope of analysis is guided by the USACE's NEPA regulations,
28 specifically 33 CFR Part 325, Appendix B paragraph 7.b.(1). In some circumstances, the
29 USACE's NEPA scope of analysis may be expanded beyond the limits of the USACE's
30 regulatory jurisdiction (i.e., the waters of the United States) to address upland portions of the
31 larger project area. Within the I-12 to Bush project area, as defined in Section 1.1, CEMVN has
32 on file a total of 188 permits for projects outside the 250-ft ROW of any alternative alignment.
33 Effects on waters of the United States from those projects could indirectly affect waters of the
34 United States for the I-12 to Bush roadway. If the government exercises *federal control and*
35 *responsibility* over both the permitted activity and the other activity occurring upland, those
36 activities are sufficiently interrelated to be included in the NEPA scope of analysis pursuant to the
37 guidance provided by Appendix B. As a result, it is necessary to include those upland projects
38 when considering cumulative effects in the project area.

39
40 CEQ regulations define a cumulative impact as "the impact on the environment which results
41 from the incremental impact of the action when added to other past, present, and reasonably
42 foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes
43 such other actions" (40 CFR 1508.7). The USACE considers a reasonably foreseeable action to
44 be a future action for which there is a realistic expectation that the action should occur. Actions in
45 the project area that pose the potential for cumulative impacts, that is, environmental or

Table 4-51. Summary of potential physical, natural, and social environmental consequences

Resource Area	No Build Alternative		Alternative B/O		Alternative J		Alternative P		Alternative Q	
	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts
Land Use	None	None	Long-term major adverse; Short-term minor adverse	Long-term moderate adverse	Long-term major adverse; Short-term minor adverse	Long-term moderate adverse	Long-term major adverse; Short-term minor adverse	Long-term moderate adverse	Long-term major adverse; Short-term minor adverse	Long-term moderate adverse
Water Resources	None	None	Long-term major and moderate adverse	Long-term major and moderate adverse	Long-term major and moderate adverse	Long-term major and moderate adverse	Long-term major and moderate adverse	Long-term major and moderate adverse	Long-term major and moderate adverse	Long-term major and moderate adverse
Ecological Resources										
Land Cover	None	None	Long-term major adverse	Long-term moderate adverse						
Wildlife	None	None	Long-term major adverse	Short-term minor adverse						
Sensitive Habitats	None	None	Long-term major adverse	Short-term minor adverse						
T&E Species	None	None	None	Long-term negligible	None	Long-term negligible	Long-term minor adverse	Long-term minor adverse	None	Long-term minor adverse
Wetlands	None	None	Long-term major adverse	Long-term moderate adverse						
Geology and Soils	None	None	Long-term major adverse	Short-term and long-term moderate adverse	Long-term major adverse	Short-term and long-term moderate adverse	Long-term major adverse	Short-term and long-term moderate adverse	Long-term major adverse	Short-term and long-term moderate adverse

**Table 4-51.
(continued)**

Resource Area	No Build Alternative		Alternative B/O		Alternative J		Alternative P		Alternative Q	
	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts
Air Quality	None	None	Short-term and long-term minor adverse	Short-term and long-term minor adverse	Short-term and long-term minor adverse	Short-term and long-term minor adverse	Short-term and long-term minor adverse	Short-term and long-term minor adverse	Short-term and long-term minor adverse	Short-term and long-term minor adverse
Noise	None	None	Short-term minor adverse	Long-term moderate adverse						
Recreational Resources	None	None	Long-term moderate adverse	Short-term and long-term minor adverse	Long-term moderate adverse	Short-term and long-term minor adverse	Long-term moderate adverse	Short-term and long-term minor adverse	Long-term moderate adverse	Short-term and long-term minor adverse
Traffic and Transportation	None	None	Long-term moderate beneficial	Long-term moderate beneficial						
Utilities	None	None	Short-term negligible	Long-term negligible						
Socioeconomics	None	None	Short-term minor beneficial	Long-term negligible beneficial						
Aesthetic and Visual Resources	None	None	Short-term minor adverse and long-term major adverse	Short-term minor adverse	Short-term minor adverse and long-term major adverse	Short-term minor adverse	Short-term minor adverse and long-term major adverse	Short-term minor adverse	Short-term minor adverse and long-term major adverse	Short-term minor adverse
Cultural Resources	None	None	None	None	None	None	None	None	None	None
Hazardous & Toxic Substances	None	None	Short-term minor adverse	Long-term minor adverse						

1 socioeconomic impacts when considered in combination with implementing the proposed action,
2 include the following:

- 3
- 4 • Construction of the interchange at I-12 and LA 1088
- 5 • Construction of a road connecting US 11 to Airport Road north of I-12
- 6 • Proposed future TND developments at LA 1088 and LA 36, and LA 36 at the abandoned
7 Gulf Mobile and Ohio Railroad corridor
- 8 • Future proposed developments at I-12 and LA 1088, LA 36 and LA 1088, I-12 and LA
9 434, and LA 21 and LA 41 near Bush (St. Tammany Parish Government 2010)
- 10 • Other future developments within the 43,500 acre area bounded by I-12, LA 59, LA 435,
11 and LA 41
- 12

13 In addition, the *New Directions 2025* comprehensive plan identifies the best potential locations
14 for business parks. Those locations include the LA 1077/I-12 interchange, LA 434/I-12
15 interchange, LA 1088/I-12 interchange, and US 190/I-12 interchange in Slidell. Potential
16 locations of regional retailing were also identified and include the LA 22/I-12 interchange in
17 Covington, LA 434/I-12 interchange, and LA 1088/I-12 interchange. Those locations were
18 recommended for potential development, but it should be noted that business and retail
19 development is not restricted to those locations, which could occur throughout the parish.
20 Alternatives B/O and P would service development at the LA 1088/I-12 interchange, and
21 Alternative Q would service development at the LA 434/I-12 interchange.

22 The activities or proposed developments listed above are relevant to this EIS because they result
23 in, or support, the continued development of St. Tammany Parish. Further, those actions indicate
24 that there is a realistic expectation for development to continue along the northshore of Lake
25 Pontchartrain, and throughout central St. Tammany Parish.

26 The strategic growth guidelines developed by St. Tammany Parish seek to continue the economic
27 growth of the region while still maintaining the integrity of the communities and rural areas. As
28 one of the fastest growing areas in Louisiana for the past two decades, St. Tammany Parish
29 continues to face challenges associated with an accelerated growth rate. The comprehensive plan
30 for St. Tammany Parish, *New Directions 2025*, was initiated in December 1998. The
31 comprehensive parish-wide planning and zoning indicates an intent to build a sustainable local
32 economy, protect sensitive environmental areas, create housing for a broad cross-section of
33 employees, and a regional transportation network to alleviate traffic congestion, provide mass
34 transit, and recreational biking and pedestrian opportunities.

35 When considered alongside the direct and indirect impacts analyzed in this EIS, the continued
36 development of St. Tammany Parish could have environmental and socioeconomic cumulative
37 impacts for the area. In this section, cumulative impacts are discussed primarily on a qualitative
38 basis as many of the environmental and socioeconomic parameters of future development are
39 unknown, but their aspects are estimated and quantified where sufficient data is available.

40 **4.18.1 Land Use**

41 *Direct Cumulative Impacts to Land Use*

42 Long-term direct major adverse cumulative impacts to land use would occur as a result of future
43 developments in the project area. Construction of an interchange at I-12 and LA 1088 is expected
44 to be completed by 2012 and would convert 102 acres of open space, including 18.67 acres of
45 pine wetlands, to developed roadway.
46

1 In January 2011, St. Tammany Parish submitted a permit application proposing to construct a 4.6
2 mile connector road with culverts and open ditch drainage from Airport Road to US 11, primarily
3 for the purpose of providing residents north of I-12 with an emergency evacuation route to US 11
4 and I-12 (USACE 2011). Approximately 22.2 acres of pine flatwood/savanna habitat and 3.0
5 acres of Waters of the United States would be impacted by this road. The remaining 27 acres are
6 non-wetland. Those habitats would be lost and converted to roadway.

7 As St. Tammany Parish continues to grow, there is a potential for land prices to increase. As
8 such, land could become more valuable to develop for commercial and residential use and less
9 likely for timber production, wildlife habitat, or other conservation purposes. Conflicts with
10 existing state, parish, or local land use plans, policies, or controls would be anticipated to occur.
11 Areas zoned as suburban, estate, industrial, and single-family residential could be converted and
12 existing homes and commercial buildings could be acquired and converted to roadway.

13 *Indirect Cumulative Impacts to Land Use*

14 Long-term indirect moderate adverse cumulative impacts to land use could occur during and after
15 construction activities of proposed developments and roadway improvements. Development
16 could indirectly induce secondary development in the project area. New developments including
17 residential and commercial areas, lodging, and convenience stores could occur as a result of
18 future development. Secondary development is limited to some extent in St. Tammany Parish
19 through zoning. A parish-wide zoning plan has been developed to concentrate industrial,
20 commercial, and business growth along existing major roads near I-12 and limit majority of the
21 project area to suburban development. The ND 2025 plan identifies the best locations for
22 business parks and regional retail facilities to be in the vicinity of intersections of local roadways
23 with I-12. As development and population in the parish increase, it could be expected to see
24 additional changes in land use from open space and natural settings to developed.

25 **4.18.2 Water Resources**

26 *Direct and Indirect Cumulative Impacts to Water Resources*

27 Long-term direct and indirect major and moderate cumulative impacts to water resources could
28 occur as a result of future developments or transportation improvements in the project area.
29 Similar to the proposed action, future roadway improvements would be designed to minimize
30 impacts to overland and channel flow in the project area. The LADOTD Hydraulics Analysis of
31 Culverts (HYDR1120) and Open Channel Flow (HYDR1140) would be used to properly size
32 culverts and bridges associated with new transportation projects.

33 Indirect cumulative impacts to wetlands could occur from future development or transportation
34 improvements in the project area. Wetlands with jurisdictional status are waters of the U.S. as
35 defined by Section 404 of the Clean Water Act and are regulated by the USACE and EPA. A
36 permit would be required prior to any dredge or fill activities in wetlands and mitigation may be
37 required to ensure no net loss of wetlands in the project area. Any unavoidable impacts to
38 wetlands would require mitigation per USACE regulations.

39 **4.18.3 Ecological Resources**

40 *Direct and Indirect Cumulative Impacts to Ecological Resources*

41 Short- and long-term direct moderate adverse cumulative impacts to ecological resources would
42 occur as a result of future developments or transportation improvements in the project area.
43 Construction of an interchange at I-12 and LA 1088 is expected to be completed by 2012. This
44 interchange is being constructed as a separate LADOTD project. Approximately 102 acres total
45 of managed timber, including 18.67 acres of wetland habitat, would be converted to developed

1 roadway. Construction of connector road from Airport Road to US 11 would impact 3.0 acres of
2 wetlands; however no impacts to threatened or endangered species or their habitat would be
3 expected.

4 Short and long-term direct moderate adverse cumulative impacts to ecological resources could
5 occur from planned development and areas zoned for development at major highway intersections
6 in the project area. Adverse impacts to ecological resources could be expected to occur. Timber
7 production areas and wetlands would be developed into residential, commercial, and mixed use
8 developments which would consist of parking lots, homes, retail buildings, and public parks.
9 Some areas would be temporarily cleared for staging but would be returned to their natural state
10 after construction. Long-term, habitat could be lost and fragmented and the edges created from
11 fragmented habitat would be expected to become biologically simplified, diminishing the value of
12 the remaining habitat (CEMVN 2008).

13 **Land Cover.** Long-term direct adverse impacts to land use would be expected to occur from
14 future developments. Timber and wetlands in the project area would be developed into
15 residential, commercial, and mixed use developments which would consist of parking lots,
16 homes, retail buildings, and public parks. Development is proposed south of LA 36 on portions
17 of approximately 43,500 acres in the project boundaries and generally contained within I-12, LA
18 59, LA 41, and south of LA 435 (Slifer 2010). Current zoning for St. Tammany indicates a
19 proposed TND at the intersection of LA 1088 and LA 36, and another at the intersection of LA 36
20 with the abandoned Gulf Mobile and Ohio Railroad corridor. Future land use indicates mixed use
21 developments at the intersections of I-12 and LA 1088, LA 36 and LA 1088, I-12 and LA 434,
22 and LA 21 and LA 41 near Bush (St. Tammany Parish Government 2010).

23 Construction of residential and commercial areas would expose bare soil and could increase
24 erosion on the construction site, temporarily degrading land cover in the drainage area. Those
25 impacts would be temporary and localized, and could degrade the quality of surrounding land
26 cover but would be expected to return to preconstruction levels after construction is complete and
27 bare soils are revegetated. Additionally, all construction activities are required to obtain an
28 LPDES General Permit for Construction Activities. Each General Permit requires the submittal
29 and maintenance of a SWP3, which is intended to reduce erosion on the construction site and
30 minimize the amount of sediment and potential pollution entering receiving streams.

31 Long-term indirect moderate adverse cumulative impacts to land cover could occur through an
32 increase in impervious coverage. Impacts from impervious development could increase water
33 pollution in the drainage area and degrade existing land uses and land cover types over time.
34 Degradation of receiving streams can typically be observed with less than 10 percent impervious
35 coverage. Runoff from impervious surfaces including roofs of homes and commercial buildings,
36 parking lots, sidewalks, and compacted soils could increase the concentration of sediment,
37 turbidity, nutrients, and temperature of receiving streams. In commercial and residential areas,
38 fertilizers are used more heavily and could result in leaching of nitrogen and phosphorus in
39 stormwater runoff. Nutrients are typically adsorbed to particulate matter and sediment from
40 roofs, roads, sidewalks, and erosion would increase turbidity and suspended sediments in
41 stormwater runoff. Higher temperatures of impervious surfaces such as roofs, roads, and
42 sidewalks could increase the temperature of stormwater runoff and increased concentrations of
43 suspended sediment could absorb more sunlight energy and slightly increase temperatures in the
44 receiving stream. Impacts to water quality from land use conversion could be minimized through
45 implementation of BMPs to minimize erosion and control sediments from entering receiving
46 streams in stormwater runoff

47 **Wildlife.** Short-term localized direct and indirect adverse cumulative impacts to wildlife could be
48 expected. Clearing and grubbing activities for construction of proposed developments and future

1 roadway improvements would temporarily displace wildlife inhabiting the area and could limit
2 future habitat because of lack of tree and shrub cover. Wildlife expected to inhabit areas prior to
3 construction include gray squirrel, fox squirrel, eastern cottontail rabbit, swamp rabbit, opossum,
4 raccoon, muskrat, and smaller rodents such as moles, shrews, skunks, and weasels. Those wildlife
5 species would be able to avoid the project area during construction and could be expected to
6 return after construction is complete. White-tailed deer, red fox, and feral pigs could pass through
7 the area after project construction is complete, but they would not be expected to re-inhabit this
8 area because of lack of vegetative cover. Bachman's sparrow is a resident species of pine
9 woodlands and prefers open pine woods in transition to forest. Clearing of timber areas could
10 displace this songbird to other remaining pine woodlands (National Audubon Society 2010a).

11 **Threatened and Endangered Species and Habitats.** Threatened and endangered species or their
12 habitats have not been identified in the project area for the I-12/LA 1088 interchange or the
13 connector road from Airport Road to US 11. These projects would not be expected to impact
14 threatened or endangered species or their habitat.

15 Indirect impacts to threatened and endangered species or habitat could occur as a result of future
16 developments or transportation improvements. Proposed development occurring in the project
17 area could impact potential habitat or threatened or endangered species; however consultation is
18 required with USFWS for any development that proposes to take a threatened or endangered
19 species or their habitat.

20 **Sensitive Terrestrial and Aquatic Habitats.** Sensitive terrestrial and aquatic habitats such as
21 pine flatwoods and savannas or other designated sensitive areas could be impacted as a result of
22 future developments and transportation improvements. Impacts to semi-permanently flooded
23 wetlands in the project area could adversely impact those aquatic species that are partially or
24 totally dependent upon wetlands for survival. Impacts to aquatic organism populations would be
25 minor and localized and construction activities would avoid waterbodies present on the site. The
26 most mobile aquatic species would be expected to disperse during project construction; however
27 benthic organisms would be impacted by construction. Impacts would be expected to be short-
28 term and localized, with minor long-term adverse impacts to the local aquatic ecosystem.

29 Approximately 22.2 acres of pine flatwood/savanna would be directly impacted and removed
30 under the connector road from Airport Road to US 11 and of those 22.2 acres, 3.0 acres are
31 wetlands. Those areas are sensitive habitats and adjacent communities could be impacted during
32 construction from runoff that could impact surrounding aquatic habitat and the aquatic and
33 benthic community. Those impacts would be expected to be short-term and localized, with long-
34 term minor adverse impacts to adjacent wetlands and streams. Zoning for St. Tammany Parish
35 does not designate conservation areas to preserve habitats identified in this area.

36 **Wetlands.** Direct impacts to 18.67 acres of jurisdictional wetlands and indirect impacts to
37 adjacent wetlands would be expected from the LA 1088 to I-12 interchange project. The project
38 could contribute to the indirect degradation of similar wetland habitat in the Bayou Chinchuba
39 drainage basin in St. Tammany Parish through changes in hydrology from removal of existing
40 wetlands. Dominant vegetation in the jurisdictional wetlands includes loblolly and slash pine,
41 sweetbay magnolia, water oak, blackgum, red maple, and sweetgum (USACE 2009).

42 Direct impacts to 3.0 acres of wetland pine flatwood/savanna would occur during construction of
43 the connector road from Airport Road to US 11. Those wetlands would be removed and
44 mitigation would occur through purchase of wetlands through a mitigation bank.

45 Indirect cumulative impacts to wetlands could occur from future development in the project area.
46 Wetlands with jurisdictional status are waters of the U.S. as defined by Section 404 of the Clean
47 Water Act and are regulated by the USACE and EPA. A permit would be required prior to any

1 dredge or fill activities in wetlands and mitigation may be required to ensure no net loss of
2 wetlands in the project area.

3 **4.18.4 Geology and Soils**

4 *Direct Cumulative Impacts to Geology and Soils*

5 Long-term direct moderate adverse cumulative impacts to geology and soils would occur as a
6 result of future developments and transportation improvements. Construction of an interchange at
7 I-12 and LA 1088 is expected to be completed by 2012, which would disturb more than 100 acres
8 of soils and substrate. Additionally, undeveloped areas are proposed to be developed into
9 residential, commercial, and mixed use developments, which would consist of parking lots,
10 homes, retail buildings, and public parks.

11 Proposed developments could include excavation of existing soils and potentially hauled-in fill
12 material of unspecified quality, quantity and source. Because of the low soil strengths and
13 wetness of hydric soils in the project area, it is likely that a certain amount of excavation would
14 be required to remove overburden material and replace it with higher strength soils. The
15 excavation and deposition of fill material would alter natural contours and in each project area.
16 Native soil profiles would be altered and redistribution of areas soils and compaction of the
17 substrate would occur over time. Soil compaction would decrease substrate porosity creating
18 barriers to surface and subsurface water flow.

19 *Indirect Cumulative Impacts to Geology and Soils*

20 Short-term indirect minor adverse cumulative impacts to geology and soils could occur during
21 construction activities for future developments in the project area. Construction of residential and
22 commercial areas would expose bare soil and could increase erosion on the construction site.
23 Sediment from construction sites could be entrained in stormwater and drain from the site which
24 could increase the turbidity and level of suspended sediments as stormwater runoff drains to
25 receiving streams. With increased turbidity and suspended organic and inorganic sediments,
26 BOD5 could increase and dissolved oxygen levels could decrease from bacteria consuming
27 organic sediments. Increases in suspended sediment could also increase sunlight reflection and
28 generate heat, resulting in slight increases in temperature of receiving streams. Those impacts
29 would be temporary and localized and would be expected to return to preconstruction levels after
30 construction is complete and bare soils are revegetated. Additionally, all construction activities
31 are required to obtain LPDES General Permit for Construction Activities and each General
32 Permit requires the submittal and maintenance of a SWP3 which is intended to reduce erosion on
33 the construction site and minimize the amount of sediment and potential pollution entering
34 receiving streams.

35 **4.18.5 Air Quality**

36 *Direct and Indirect Cumulative Impacts to Air Quality*

37 Long-term negligible adverse cumulative impacts to air quality would be expected as a result of
38 future developments and transportation improvements. The effects would primarily be due to the
39 natural increase in traffic in the study area. Changes in air-quality when compared to existing
40 conditions would be minimal.

41 The action would have short- and long-term negligible adverse cumulative impacts to air quality.
42 By directly inventorying all emission in a nonattainment region and monitoring concentrations of
43 criteria pollutants in attainment regions, the state of Louisiana takes into account the impacts of
44 all past, present, and reasonably foreseeable emissions in the state. This is done by putting a
45 regulatory structure in place designed to prevent air quality deterioration for areas that are in

1 attainment with the NAAQS and to reduce common or criteria pollutants emitted in
2 nonattainment areas to levels that will achieve compliance with the NAAQS. This structure of
3 rules and regulations are contained in the SIP. SIPs are the regulations and other materials for
4 meeting clean air standards and associated CAA requirements. SIPs include:

- 5 • State regulations that EPA has approved;
- 6 • State-issued, EPA-approved orders requiring pollution control at individual
7 companies;
- 8 • Planning documents such as area-specific compilations of emissions estimates and
9 computer simulations (modeling analyses) demonstrating that the regulatory limits
10 assure that the air will meet air quality standards (USEPA 2010a).

11 The SIP process includes either specifically or indirectly all activities in the region. No large-
12 scale projects or proposals have been identified that when combined with the proposed action
13 would threaten the attainment status of the region, would have substantial GHG emissions, or
14 would lead to a violation of any federal, state, or local air regulation.

15 The states specifically account for all significant stationary, area, and mobile emission sources in
16 nonattainment areas within the SIPs, and indirectly accounts for all emission sources in
17 attainment areas though physically monitoring areas that are in attainment. There are no new
18 appreciable sources of direct or indirect emissions associated with any of the proposed
19 developments.

20 **4.18.6 Noise**

21 *Direct and Indirect Cumulative Impacts to Noise*

22 Long-term minor adverse cumulative impacts to the noise environment would be expected as a
23 result of future developments and transportation improvements. The impacts would primarily be
24 due to the natural increase in traffic and population in the project area.

25 **4.18.7 Recreation Resources**

26 *Direct Cumulative Impacts to Recreational Resources*

27 Long-term direct minor adverse cumulative impacts to recreational resources could occur as a
28 result of future developments and transportation improvements. Undeveloped areas would be
29 developed into residential, commercial, and mixed use developments which would consist of
30 parking lots, homes, retail buildings, and public parks. Development of these areas would result
31 in the loss of fish and wildlife habitat that are used for nature-based recreation. People traveling
32 to the area for bird watching, hunting and fishing, and other nature-based recreational
33 opportunities would see a decrease in the available natural areas that play host to these
34 opportunities.

35 *Indirect Cumulative Impacts to Recreational Resources*

36 Short-term and long-term indirect minor adverse cumulative impacts to recreational resources
37 could occur as a result of future developments and roadway improvements. Increased runoff and
38 erosion could result from construction activities over the short-term, as well as an increase in
39 impervious surfaces associated with development over the long-term. Increases in runoff and
40 erosion could impact areas used for nature-based recreation by affecting the quality of the fish
41 and wildlife habitat.

4.18.8 Traffic and Transportation

Direct and Indirect Cumulative Impacts to Traffic and Transportation

As described in Section 4.9, construction of the proposed roadway would be expected to provide travel time savings between I-12 and Bush when compared to existing travel routes. Once the new roadway is constructed, it would be expected that traffic would be diverted from the existing routes improving the LOS and delay conditions on these routes. Although, it should be noted that the more traffic diverted to the new roadway, more volume would be created on the roadway, which could lead to increased delays at the intersections along the new route. It could be expected that the traffic volume on the existing routes and new roadway would continue to increase as the population in St. Tammany Parish increases as projected. As a result, it could be expected that additional transportation improvement projects, after the new roadway is constructed, would be necessary as the LOS in the transportation network is exceeded. These new transportation improvement projects would be expected to have a long-term moderate beneficial cumulative impact to the transportation network.

4.18.9 Utilities

Direct and Indirect Cumulative Impacts to Utilities

Proposed future developments and roadway improvements would have negligible cumulative impacts on utilities. Proposed and current developments may require relocation or temporary suspension of water, gas, and electric lines, but no long-term suspension of any of these utilities would be anticipated.

4.18.10 Socioeconomic Impacts

Direct and Indirect Cumulative Impacts to Socioeconomics

Short-term minor beneficial cumulative socioeconomic effects would be expected upon implementation of the proposed action. In the short-term, the expenditures associated with construction of the proposed roadway would increase ROI economic variables including employment opportunities, regional Gross Domestic Product and real personal income. The vendors and laborers in the construction industry would particularly benefit from the proposed action. A regional benefit of any type of development is the construction spending, especially if local labor and materials are used, although the direct economic benefits would be short-term, lasting for the duration of the construction period. On the basis of the size of the ROI, the size of its labor force, and the unemployment rate in the ROI, there should be a sufficient labor within the ROI to fill the construction jobs. The money spent during the construction phase would be cycled through the local economy through subsequent business spending, including taxes, and wages spent locally, further creating indirect and induced economic benefits. Construction and operation of the proposed highway would have a very small impact to employment, real personal income, regional GDP, and population. These impacts would be very small for the entire ROI, or St. Tammany and Washington Parishes, individually (REMI 2010).

Construction of the proposed highway could make land previously inaccessible for development available for future growth. Secondary development along a new roadway, in the form of gas stations, convenience stores, etc., could result in future growth in the project area. An increase in development could also lead to a shift in residential growth from single-family homes on large lots to more dense neighborhoods.

Additionally, the population of St. Tammany Parish is expected to continue growing over the next 10 years at a rate higher than the U.S. average, unrelated to the proposed project. The population growth during the last few years can be attributed to St. Tammany's location as a bedroom

1 community of greater New Orleans. Washington Parish is expected to grow at a similar rate than
2 the national rate until 2015, fall below national rates until 2040, and then grow at a rate equal to
3 or slightly faster than the national rate from 2045 to 2050.

4 TNDs and other mixed use developments are proposed within the project area. Current planning
5 documents for St. Tammany indicate a proposed TND at the intersection of LA 1088 and LA 36,
6 and another at the intersection of LA 36 with the abandoned Gulf Mobile and Ohio Railroad
7 corridor. Future land use plans indicate mixed use developments at the intersections of I-12 and
8 LA 1088, LA 36 and LA 1088, I-12 and LA 434, and LA 21 and LA 41 near Bush (St. Tammany
9 Parish Government 2010). Similar to the proposed roadway, these projects would have short-term
10 beneficial impacts to some socioeconomic variables through the use of local labor and vendors
11 lasting for the duration of the construction period. In addition, long-term beneficial impacts could
12 be expected as the new developments would likely include businesses that would employ the
13 local population, generating local income and advancing economic development in the region.

14 These future residential, commercial, and industrial developments, combined with the expected
15 impacts from the proposed roadway, would have beneficial and adverse cumulative impacts on
16 the ROI. These actions would benefit the ROI by contributing to the projected economic growth
17 in regional employment, real personal income, and Gross Domestic Product. An adverse impact
18 could result from the sustained demand of the increased population on the region's infrastructure
19 and the local government's ability to expand to meet the demand for community and public
20 services. The strategic growth plan for St. Tammany Parish anticipates continued development
21 and has management goals in place to counter strains on public resources.

22 **4.18.11 Aesthetic and Visual Resources**

23 *Direct and Indirect Cumulative Impacts to Aesthetics and Visual Resources*

24 Proposed future developments and roadway improvements would have impacts to aesthetics and
25 visual resources. Aesthetic values of the project area would be permanently impacted due to
26 visual, auditory and physical changes resulting from conversion of forested and rural areas to
27 mixed-use developments. Impacts from the proposed developments would be expected to be
28 minor, localized and long-term.

29 **4.19 UNAVOIDABLE ADVERSE IMPACTS**

30 Unavoidable adverse impacts are environmental impacts beyond which could be reduced through
31 mitigation. The principal unavoidable adverse impacts on the environment are summarized
32 below.

33 **4.19.1 Land Use and Land Cover**

34 As St. Tammany Parish continues to grow, there is a potential for land prices to increase. As
35 such, land could become more valuable to develop for commercial and residential use and less
36 likely for timber production, wildlife habitat, or other conservation purposes. Permanent changes
37 in land use and land cover would result from construction of the proposed roadway and future
38 transportation improvement projects. Existing land use, land cover, or habitat would be replaced
39 with impervious road surfaces and a simplified habitat of grasses and herbaceous material.

40 **4.19.2 Ecological Resources**

41 Construction of the proposed roadway would result in unavoidable loss of sensitive habitats in the
42 project area, particularly those wetlands located outside the 250-ft ROW of the alternative
43 alignment. Other habitats directly impacted, specifically pine flatwood/savanna areas, could result
44 in impacts to wildlife and other sensitive species as described in Section 4.4. Once the new

1 roadway is constructed there could be permanent changes to surface water flows in the area. Also,
2 use of the roadway could lead to introduction of nutrients and exotic species that are not easily
3 eradicated. Permanent changes in land use could reduce the amount of available habitat for
4 wildlife and aquatic species. These habitat impacts could be offset through mitigation efforts as
5 described in Section 4.21.

6 **4.19.3 Aesthetic and Visual Resources**

7 Some loss of scenic attractiveness and scenic integrity would be associated with the construction
8 of the proposed roadway. The proposed roadway would replace rural, forested areas with
9 impervious road surfaces and a simplified habitat of grasses and herbaceous material in the 250-ft
10 ROW.

11 **4.20 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES**

12 Irreversible commitment of resources would be expected to result directly from construction of
13 the proposed roadway because these resources would be expended in a way that could not be
14 recovered once committed to the proposed project. They are:

- 15 1. A commitment of wetland resources with associated changes in drainage patterns that
16 would be difficult to reverse or retrieve.
- 17 2. Irreversible and irretrievable commitment of financial resources.
- 18 3. An undetermined volume of fuel, as well as other types of energy resources, would be
19 expended during the construction of the proposed facilities
- 20 4. Permanent changes to aesthetic and visual resources in the project area would be
21 expected.

22 **4.21 MITIGATION SUMMARY**

23 Mitigation is an important component of the NEPA process that is used to avoid, minimize, or
24 compensate for adverse environmental impacts associated with the proposed action. Mitigation
25 actions are considered throughout the NEPA process to develop the proposed action and
26 alternatives.

27 **4.21.1 Avoidance**

28 **4.21.1.1 Ecological Resources**

29 During the first stages of screening analysis, four alternatives were removed from further
30 consideration to avoid impacts to wetland mitigation banks. Those four alternatives would have
31 directly impacted Talisheek Pine Wetland Mitigation Bank and Bayou Lacombe Mitigation Bank.
32 All credits available for both mitigation banks have been purchased and direct loss of protected
33 land would not have been feasible.

34 Wetlands were avoided where possible to minimize direct and indirect impacts. A portion of
35 Alternative B/O overlapped with existing LA 20 and portions of alignments J, P, and Q are
36 proposed to lay over an abandoned railroad track to minimize impacts to ecological resources.

37 Bayou Lacombe is designated as a Scenic River and Alternative Q alignment was adjusted to
38 avoid crossing this channel.

4.21.2 Minimization

4.21.2.1 Land Use

Impacts to land use were minimized by reducing the overall ROW width for the alignments to a maximum of 250 feet. This minimized direct impacts to existing land use, minimizing the amount of land converted to impervious road surfaces and a simplified habitat of grasses and herbaceous material.

4.21.2.2 Water Resources

Impacts to the water resources were minimized by reducing the overall ROW width for the alignments to a maximum of 250 feet. This minimized direct impacts to aquatic habitats, wetlands, and hydrology along each alternative's ROW.

LADOTD's recommendations were used as the basis for the design because of generally flat channel slopes in the project area. For major culvert crossings, the guidelines recommend a maximum allowable differential head of one foot with consideration for future land development. Additionally, a standard uniform slope of 0.1% (0.001 ft/ft) was used for all major culverts and culverts would be designed on the same slope as the natural streambed slope. A complete survey would be conducted during the design phase of this project, and major culverts would be reevaluated using the updated channel slope data. Structures with high outlet velocities (greater than 9 feet/second) will require discharge erosion protection at the time of final design.

Bridges were proposed over major stream crossings where drainage basins are greater than 2,000 acres to minimize impacts to stream flows. Minor cross drain culverts are proposed to be installed every 1,500 feet on long continuous grades as recommended by the LADOTD Hydraulics Manual. Equalizers would be 24-inch diameter pipes or round equivalent pipe arches at zero percent slopes. Those equalizer pipes would distribute flow between channels on either side of the road to allow water to move via sheet flow to mimic water flows in the project area. Table 4-52 describes the number of bridges, equalizer culverts, and major culverts proposed for each alternative.

Table 4-52.
Bridge and culvert crossings for the build alternatives

	Alternative B/O	Alternative J	Alternative P	Alternative Q
Bridges	7	6	7	3
Equalizer Culverts	67	78	54	71
Major Culverts	23	24	23	22

BMPs would be used before, during, and after construction to minimize environmental impacts. BMPs are tools designed to minimize environmental impacts by timing construction activities, using certain construction methods, or methods to protect resources. During construction, BMPs would be employed to minimize erosion and sedimentation in the project area and prevent sediment and other pollutants from being released and entering receiving streams and wetlands.

All construction activities are required to obtain an LPDES General Permit for Construction Activities. Each permit application requires the preparation of an SWP3 45 days prior to the beginning of construction and it is submitted to the Louisiana Department of Environmental Quality. Typically, this plan is used to prepare the erosion control table, which delineates the

1 type and location of the required erosion control measures. BMPs belong to one of the ten
2 following categories:

- 3 • Minimize disturbed area and protect natural features and soil
- 4 • Phase construction activity
- 5 • Control stormwater flowing onto and through the project
- 6 • Stabilize slopes
- 7 • Protect slopes
- 8 • Protect storm drain inlets
- 9 • Establish perimeter controls and sediment barriers
- 10 • Retain sediment on-site and control dewatering practices
- 11 • Establish stabilized construction exits
- 12 • Any additional BMPs

13 LADOTD also requires temporary and permanent erosion control during roadway construction.
14 Details for these BMP are in LADOTD's Roadway Design Procedures, Section 4.5.2. Temporary
15 erosion control items include:

- 16 • Bales
- 17 • Settling basins
- 18 • Temporary seeding
- 19 • Check dams
- 20 • Embankment drains
- 21 • Silt fencing
- 22 • Embankment berms

23 Permanent erosion control items consist of:

- 24 • Seeding
- 25 • Vegetative mulch
- 26 • Flexible or rigid revetment
- 27 • Energy dissipaters
- 28 • Erosion control matting

29 The 2006 edition of the *Louisiana Standard Specification for Roads and Bridges* includes
30 construction guidance for erosion control devices including rip rap, revetments, sodding, mulch
31 and soil retention blankets.

32 **4.21.2.3 Ecological Resources**

33 BMPs would be implemented to protect ecological resources during construction as described
34 above for Water Resources.

35 Where wetlands could not be avoided, additional impacts were minimized by removing roadside
36 ditches in the roadway design in wetland areas. A potential exists for roadside ditches to drain
37 wetlands in an undesirable manner and create additional impacts. The typical roadway cross

1 section in wetland areas would be elevated above the wetlands and constructed with equalizer
2 pipes to minimize the disturbance of sheet flow of waters crossing the ROW.

3 **4.21.2.4 Geology and Soils**

4 BMPs would be implemented to minimize impacts to geology and soils during construction as
5 described above for Water Resources.

6
7 Impacts to geology and soils were minimized by reducing the overall ROW width for the
8 alignments to a maximum of 250 feet. Staging areas would be placed in the existing ROW to
9 minimize site disturbance.

10 **4.21.2.5 Air Quality**

11 Construction would require the use of equipment that would emit small amounts of criteria
12 pollutants and GHG. There would be emissions from the use of heavy trucks, fugitive particles
13 from surface disturbance, and workers' commutes. The quantities of pollutants emitted by
14 construction activities would be small and would not contribute to violations of any federal, state,
15 or local air regulation. Air emissions from those activities would be short lived and would cease
16 upon the completion of the construction activities. All construction would be accomplished in full
17 compliance with the Louisiana Regulations for the Control and Abatement of Air Pollution,
18 particularly Title 33 Part III. Chapters of relevance are as follows:

- 19 • Chapter 11, Control of Emissions of Smoke
- 20 • Chapter 13, Emission Standards for Particulate Matter
- 21 • Chapter 21, Control of Emissions of Organic Compounds

22 BMPs to minimize impacts to air quality could be required during construction. Those
23 requirements could include:

- 24 • Reducing visible emissions and fugitive dust and emissions through watering
- 25 • Using BMPs during asphalt paving operations
- 26 • Limiting or restricting open burning activities
- 27 • Appropriate use of portable fuel containers
- 28 • Meeting new engine standards for non-road vehicles
- 29 • Using low VOC architectural, industrial, and maintenance coatings

30 LAC 33, Chapter 11 authorizes outdoor burning from such area in land clearing and ROW
31 maintenance operations if the following conditions are met:

- 32 • Prevailing winds at the time of the burning must be away from any city or town, the
33 ambient air of which may be affected by smoke from the burning
- 34 • The location of the burning must be at least 1,000 feet from any dwelling other than a
35 dwelling or structure located on the property on which the burning is conducted;
- 36 • Care must be used to minimize the amount of dirt on the material being burned
- 37 • Heavy oils, asphaltic materials, items containing natural or synthetic rubber, or any
38 materials other than plant growth which produce unreasonable amounts of smoke
39 may not be burned; nor may these substances be used to start a fire
- 40 • The burning may be conducted only between the hours of 8 a.m. and 5 p.m. Piles of
41 combustible material should be of such size to allow complete reduction in this time
42 interval

1 Traffic hazards are prohibited by Chapter 11. The emission of smoke, suspended particulate
2 matter or uncombined water or any air contaminants or combinations thereof which passes onto
3 or across a public road and creates a traffic hazard by *impairment of visibility*, as defined in LAC
4 33:III.111, or intensifies an existing traffic hazard condition is prohibited.

5 LAC Title 33, Chapter 13, Subchapter A requires all reasonable precautions shall be taken to
6 prevent particulate matter from becoming airborne. These precautions include:

- 7 • Use of water or chemicals for control of dust in the demolition of existing buildings
8 or structures, construction operations, the grading of roads, or the clearing of land
- 9 • Application of asphalt, oil, water, or suitable chemicals on dirt roads, materials
10 stockpiles, and other surfaces which could give rise to airborne dusts
- 11 • Installation and use of dust collectors to enclose and vent the handling of dusty
12 materials. Adequate containment methods shall be employed during sandblasting or
13 other similar operations
- 14 • Open-bodied trucks transporting materials likely to give rise to airborne dust shall be
15 covered at all times when in motion
- 16 • Conducting agricultural practices such as tilling of land, application of fertilizers and
17 insecticides in such a manner as to prevent dust from becoming airborne
- 18 • Paving roadways and maintaining the roadways in a clean condition
- 19 • The prompt removal of earth or other material from paved streets onto which earth or
20 other material has been transported by trucking or earth moving equipment, erosion
21 by water or other means.

22 Chapter 21 discusses best practical housekeeping and maintenance practices to reduce the
23 quantity of organic compounds emissions. Emission of organic compounds must be reduced
24 wherever feasible. Good housekeeping practices include:

- 25 • Spills of volatile organic compounds shall be avoided and clean up of such spills
26 shall employ procedures that reduce or eliminate the emission of volatile organic
27 compounds
- 28 • Containers of volatile organic compounds shall not be left open and the contents
29 allowed to evaporate
- 30 • Waste materials that contain volatile organic compounds shall be stored and disposed
31 of in a manner that reduces or eliminates the emission of volatile organic compounds
- 32 • Each facility shall develop a written plan for housekeeping and maintenance that
33 places emphasis on the prevention or reduction of volatile organic compound
34 emissions from the facility. This plan shall be submitted to the Office of
35 Environmental Services upon request
- 36 • A copy shall be kept at the facility, if practical, or at an alternate site approved by the
37 department
- 38 • Good housekeeping shall be determined by compliance with LAC 33:III.2121
39 (Fugitive Emission Control) and the maintenance and the housekeeping plan required
40 by LAC 33:III.2113.A.4.

4.21.2.6 Noise

Alternative B/O

Since 124 identified receptors would experience a greater than 10 dBA increase when compared to existing conditions, noise abatement measures for reducing or eliminating the noise impacts have been considered for Alternative B/O.

Highway alignment modification was not considered practical, as the highway alignment has been designed to reduce human and environmental impact to the maximum extent practicable while meeting DOTD design guidelines. The use of insulation as a noise abatement measure is only a consideration for public use or nonprofit institutional structures and is normally limited to public use structures such as schools and hospitals. No such facilities were identified along the new highway portions of Alternative B/O.

Noise barriers are most often used on high-speed, limited-access facilities where noise levels are high and adequate space is available for continuous barriers. For a noise barrier to provide sufficient noise reduction, it must be high enough and long enough to shield receptors from sizeable sections of the noise-producing roadway. Access openings in a barrier created by driveways or intersections severely reduce the effectiveness. Therefore, ground-mounted barriers in locations that would require multiple access openings for cross streets and driveways were not included in the analysis. In addition, LADOTD only considers noise barriers for new control of access facilities for state funded projects such as this project.

Barriers are not an economical noise abatement method for individual or dispersed receptors. LADOTD Traffic Noise Policy requires that a barrier be both *feasible* and *reasonable*. For low-density residential receptors, *reasonableness* is the primary determining factor for noise barrier analysis. The policy states that to be reasonable the cost of the abatement measure should not exceed \$25,000 per benefited receptor. A benefited receptor is defined as a sensitive receptor, whether impacted or not, receiving a noise reduction of at least 5 dBA as a result of the proposed abatement measure.

The receptors identified as potential for noise barriers are in low-density areas and the distance between the proposed highway and the receptors is relatively large. A bounded analysis was performed to determine the potential reasonableness for noise barriers along the Control of Access Portion of the highway near receptors with a 10 or greater dBA increase in traffic noise. For analysis purposes it was assumed that all receptors might receive a 5-dBA reduction from a 10-foot tall, ground mounted noise barrier. Because some receptors would not receive this benefit, and noise barriers would need to be taller than 10-feet, the actual cost per benefited receptor would be greater than those described herein. The bare minimum cost for noise barriers would be greater than \$25,000 per receptor, ranging from \$40,966 to \$217,800 per receptor (Table 4-53). Therefore, the receptors are too wide spread along the Control of Access portions of Alternative B/O to make a noise barrier reasonable regardless of the height of the barrier or the overall benefit per receptor. No noise barrier location was found to be both reasonable and feasible on the basis of all established criteria considered.

Table 4-53.
Minimum cost for noise barriers - Alternative B/O

Location	Minimum Length of Barrier [miles]	Number of Receptors	Minimum Cost Per Receptor
South of LA21 / North of LA435 East of proposed highway	1.5	58	\$40,966
South of LA435 / North of LA36 East of proposed highway	0.9	22	\$64,800
South of LA21 / North of LA435 West of proposed highway	1.1	8	\$217,800

Even with refinements to the alignment or additional precision to the noise modeling, it is not expected that the overall number of receptors with a greater than 10 dBA increase in noise or the minimum length of the noise barrier required would change appreciably. Therefore, noise barriers would not become reasonable with those refinements.

Alternative J

Since 43 identified receptors would experience a greater than 10 dBA increase when compared to existing conditions, noise abatement measures for reducing or eliminating the noise impacts have been considered. As with Alternative B/O, and for similar reasons, highway alignment modification was not considered practical, as the highway alignment has been designed to reduce human and environmental impact to the maximum extent practicable while meeting DOTD design guidelines. In addition, no public use or nonprofit institutional facilities were identified along the new highway portions of Alternative J.

As with Alternative B/O, the receptors identified as potential for noise barriers are in low-density areas and the distance between the proposed highway and the receptors is relatively large. A bounded analysis was performed to determine the potential reasonableness for noise barriers along the Control of Access Portion of the highway near receptors with a 10 or greater dBA increase in traffic noise. The bare minimum cost for noise barriers would be greater than \$25,000 per receptor, ranging from \$105,600 to \$475,200 per receptor (Table 4-54). Therefore, the receptors are too wide spread along the Control of Access portions of Alternative J to make a noise barrier *reasonable* regardless of the height of the barrier or the overall benefit per receptor.

Table 4-54.
Minimum cost for noise barriers - Alternative J

Location	Length of Barrier [miles]	Number of Receptors	Minimum Cost Per Receptor
South of Bush / North of Talisheek East of proposed highway	2.4	36	\$105,600
South of Bush / North of Talisheek West of proposed highway	1.5	5	\$475,200

Even with refinements to the alignment or additional precision to the noise modeling, it is not expected that the overall number of receptors with a greater than 10 dBA increase in noise or the minimum length of the noise barrier required would change appreciably. Therefore, noise barriers would not become reasonable with those refinements.

Alternative P

Since 110 identified receptors would experience a greater than 10 dBA increase when compared to existing conditions, noise abatement measures for reducing or eliminating the noise impacts have been considered. As with Alternative B/O, and for similar reasons, highway alignment modification was not considered practical, as the highway alignment has been designed to reduce human and environmental impact to the maximum extent practicable while meeting LADOTD design guidelines. In addition, no public use or nonprofit institutional facilities were identified along the new highway portions of Alternative P.

As with Alternative B/O, the receptors identified as potential for noise barriers are in low-density areas and the distance between the proposed highway and the receptors is relatively large. A bounded analysis was performed to determine the potential reasonableness for noise barriers along the Control of Access Portion of the highway near receptors with a 10 or greater dBA increase in traffic noise. The bare minimum cost for noise barriers would be greater than \$25,000 per receptor, ranging from \$99,460 to \$792,000 per receptor (Table 4-55). Therefore, the receptors are too wide spread along the Control of Access portions of Alternative P to make a noise barrier *reasonable* regardless of the height of the barrier or the overall benefit per receptor.

Table 4-55.
Minimum cost for noise barriers - Alternative P

Location	Minimum Length of Barrier [miles]	Number of Receptors	Minimum Cost Per Receptor
South of Bush / North of Talisheek East of proposed highway	2.7	43	\$99,460
South of Bush / North of Talisheek West of proposed highway	1.5	3	\$792,000
South of Talisheek / North of LA36 East of proposed highway	2.45	30	\$129,360
South of Talisheek / North of LA36 West of proposed highway	2.14	22	\$154,080

Even with refinements to the alignment or additional precision to the noise modeling, it is not expected that the overall number of receptors with a greater than 10 dBA increase in noise or the minimum length of the noise barrier required would change appreciably. Therefore, noise barriers would not become reasonable with these refinements.

Alternative Q

Since 29 identified receptors would experience a greater than 10 dBA increase when compared to existing conditions, noise abatement measures for reducing or eliminating the noise impacts have been considered. As with Alternative B/O, and for similar reasons, highway alignment modification was not considered practical, as the highway alignment has been designed to reduce human and environmental impact to the maximum extent practicable while meeting LADOTD design guidelines. In addition, no public use or nonprofit institutional facilities were identified along the new highway portions of Alternative Q.

As with Alternative B/O, the receptors identified as potential for noise barriers are in low-density areas and the distance between the proposed highway and the receptors is relatively large. A bounded analysis was performed to determine the potential reasonableness for noise barriers along the Control of Access Portion of the highway near receptors with a 10 or greater dBA increase in traffic noise. The bare minimum cost for noise barriers would be greater than \$25,000 per receptor, ranging from \$172,000 to \$792,000 per receptor (Table 4-56). Therefore, the

1 receptors are too wide spread along the Control of Access portions of Alternative Q to make a
2 noise barrier *reasonable* regardless of the height of the barrier or the overall benefit per receptor.

3 **Table 4-56.**
4 **Minimum cost for noise barriers - Alternative Q**

Location	Minimum Length of Barrier [miles]	Number of Receptors	Minimum Cost Per Receptor
South of Bush / North of Talisheek East of proposed highway	2.4	22	\$172,800
South of Bush / North of Talisheek West of proposed highway	1.5	3	\$792,000

5
6
7 Even with refinements to the alignment or additional precision to the noise modeling, it is not
8 expected that the overall number of receptors with a greater than 10 dBA increase in noise or the
9 minimum length of the noise barrier required would change appreciably. Therefore, noise barriers
10 would not become reasonable with these refinements.

11 **4.21.2.7 Utilities**

12 Impacts to the utilities were minimized by reducing the overall ROW width for the alignments to
13 a maximum of 250 feet. This minimized direct impacts to utilities and pipelines along or crossing
14 each alternative's ROW.

15 **4.21.2.8 Socioeconomics**

16 Impacts to the socioeconomic environment were minimized by reducing the overall ROW width
17 for the alignments to a maximum of 250 feet. This minimized direct impacts to housing units and
18 businesses along each alternative's ROW.

19 **4.21.2.9 Children's Environmental Health and Safety Risks**

20 One existing public school, Fifth Ward Junior High School, with an enrollment of 531 students in
21 2008/09 school year (NCES undated) is within the 250 ft right-of-way Alternative B/O. There are
22 no plans to relocate the school should this alternative be selected. Should this alternative be
23 selected, short-term minor adverse impacts on the protection of children would be expected.
24 Because construction sites can be enticing to children, construction activity could pose an
25 increased safety risk. During construction, the safety measures stated in 29 CFR Part 1926, *Safety
26 and Health Regulations for Construction*, would be followed to protect the health and safety of
27 the children and other nearby residents and construction workers. For example, barriers and "No
28 Trespassing" signs could be placed around construction sites to deter children from playing in
29 these areas and that construction vehicles and equipment be secured when not in use. In addition,
30 permanent, appropriate safety devices/measures could be installed and implemented to mitigate
31 the risks associated with the expected increase in vehicle traffic volume.

32 **4.21.2.10 Aesthetic and Visual Resources**

33 Impacts to the natural environment were minimized by reducing the overall ROW width for the
34 alignments to a maximum of 250 feet. This minimized direct impacts to aesthetic and visual
35 resources along each alternative's ROW.

4.21.2.11 Cultural Resources

A Phase I cultural resources survey was conducted for each alternative alignment between April and October 2010. The previously recorded Gum Swamp site is within Alternative P. The site is eligible for nomination to the NRHP and should be avoided during all phases of highway construction. If this site cannot be avoided, archaeological mitigation should be undertaken.

Should any additional archaeological cultural resources be encountered during project activities, work shall cease in the immediate area and the SHPO consulted immediately to minimize impacts to the resource.

4.21.2.12 Hazardous and Toxic Substances and Pollution

Short-term minor adverse impacts would be expected from hazardous materials used and wastes generated during construction under this alternative. The use of these materials and generated wastes could create a potential for hazardous spills. Construction contractors would be required to comply with all local, state, and federal regulations pertaining to the handling and management of hazardous materials waste to minimize impacts to the environment.

4.21.3 Compensation

4.21.3.1 Ecological Resources

Significant direct and indirect adverse impacts would be expected to wetlands for all alignments. The number of mitigation credits required for each alignment was calculated using the Modified Charleston Method (MCM) developed by the USACE. The MCM is an assessment model based on evaluation criteria weighted by their importance used to calculate the required amount of compensatory mitigation to offset project impacts. Table 4-57 lists the mitigation credits required for each alternative. It should be noted that these credits are preliminary and could increase or decrease based on final engineering design of the roadway and environmental conditions.

Table 4-57.
Direct and indirect wetland mitigation acreage

Alternative	Direct wetland impact (acres)	Preliminary MCM direct impact credits	Indirect wetland impacts (acres) ^a	Preliminary MCM indirect impact credits	Preliminary Total MCM credits
B/O	385	7930.5	253	2714.4	10,644.9
J	373	6722.2	292	2297.0	9019.2
P	358	7272.4	208	2107.7	9380.1
Q	305	4945.8	231	1924.0	6869.8

^aincludes only drought and ponding indirect impacts

4.21.3.2 Socioeconomics

Under Alternative B/O, existing development in the proposed ROW would be relocated or removed. An estimated 14 families would be displaced and all are owner-occupants. Five businesses would also be displaced including: three service stations, one Dollar General store, and one insurance company. Those businesses and home owners would be required to be relocated. Fifth Ward Jr. High School could qualify for functional replacement. Twelve classrooms, a gymnasium, and the administrative offices would be directly impacted and would take approximately two years to replace (C.H. Fenstermaker 2011). The Functional Replacement Program allows for publicly owned and publicly used facilities to be replaced with a functionally new or existing facility (C.H. Fenstermaker 2011).

1 The Slidell Head-start building would be impacted under Alternative J. The building appears to
 2 be publicly owned and used by the public, therefore it would qualify for functional replacement.
 3 The Functional Replacement Program allows for publicly owned and publicly used facilities to be
 4 replaced with a functionally new or existing facility (C.H. Fenstermaker 2011).

5 Under Alternative P, existing development in the proposed ROW would be relocated or removed
 6 and would displace approximately six families. Two of the six families occupy mobile homes and
 7 only replacement sites would be required. No businesses or facilities would be expected to be
 8 displaced (C.H. Fenstermaker 2011).

9 Under Alternative Q, existing development in the proposed right-of-way would displace
 10 approximately 19 families. Fifteen of the 19 families occupy mobile homes and replacement sites
 11 for those homes would be required (C.H. Fenstermaker 2011).

12 Estimated compensation for each alignment is presented in Tables 4-58 through 4-61.
 13 Compensation costs include moving costs, replacement housing costs (RHP), services, and fees.

14
 15 **Table 4-58.**
 16 **Alternative B/O relocation cost summary**

Residential/Non Residential	Moving Cost	RHP	Services	Fees
Mobile Homes (4)	\$7,600	\$40,000	\$4,000	\$28,800
Single Family Dwellings (10)	\$18,200	\$225,000	\$10,000	\$86,400
Businesses (5)	\$250,000	\$0	\$5,000	\$43,200
Personality Only (4)	\$75,000	\$0	\$4,000	\$9,600
Functional Replacement	\$50,000	\$0	\$1,000	\$7,200
Subtotal	\$400,800	\$265,000	\$24,000	\$175,200
Total Relocation Cost	\$865,000			

17
 18 **Table 4-59.**
 19 **Alternative J relocation cost summary**

Residential/Non Residential	Moving Cost	RHP	Services	Fees
Mobile Homes (15)	\$27,200	\$150,000	\$15,000	\$108,000
Apartments (25)	\$37,500	\$131,250	\$25,000	\$192,960
Single Family Dwellings (5)	\$8,700	\$112,500	\$5,000	\$43,200
Multiple Family Dwellings (6)	\$9,000	\$135,000	\$6,000	\$51,840
Businesses (14)	\$605,000	\$0	\$14,000	\$120,960
Personality Only (1)	\$10,000	\$0	\$1,000	\$2,400
Functional Replacement (1)	\$50,000	\$0	\$1,000	\$7,200
Subtotal	\$687,000	\$528,750	\$67,000	\$526,560
Total Relocation Cost	\$1,809,710			

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**Table 4-60.
Alternative P relocation cost summary**

Residential/Non Residential	Moving Cost	RHP	Services	Fees
Mobile Homes (2)	\$3,800	\$20,000	\$2,000	\$14,400
Single Family Dwellings (4)	\$7,400	\$90,000	\$4,000	\$34,560
Businesses	\$0	\$0	\$0	\$0
Personality Only (1)	\$12,000	\$0	\$1,000	\$24,000
Functional Replacement	\$0	\$0	\$0	\$0
Subtotal	\$23,200	\$110,000	\$7,000	\$72,960
Total Relocation Cost \$213,160				

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**Table 4-61.
Alternative Q Relocation Cost Summary**

Residential/Non Residential	Moving Cost	RHP	Services	Fees
Mobile Homes (15)	\$28,100	\$150,000	\$15,000	\$108,000
Single Family Dwellings (4)	\$6,800	\$90,000	\$4,000	\$34,560
Businesses	\$0	\$0	\$0	\$0
Personality Only (1)	\$0	\$0	\$0	\$0
Functional Replacement	\$0	\$0	\$0	\$0
Subtotal	\$34,900	\$240,000	\$19,000	\$142,560
Total Relocation Cost \$436,460				

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