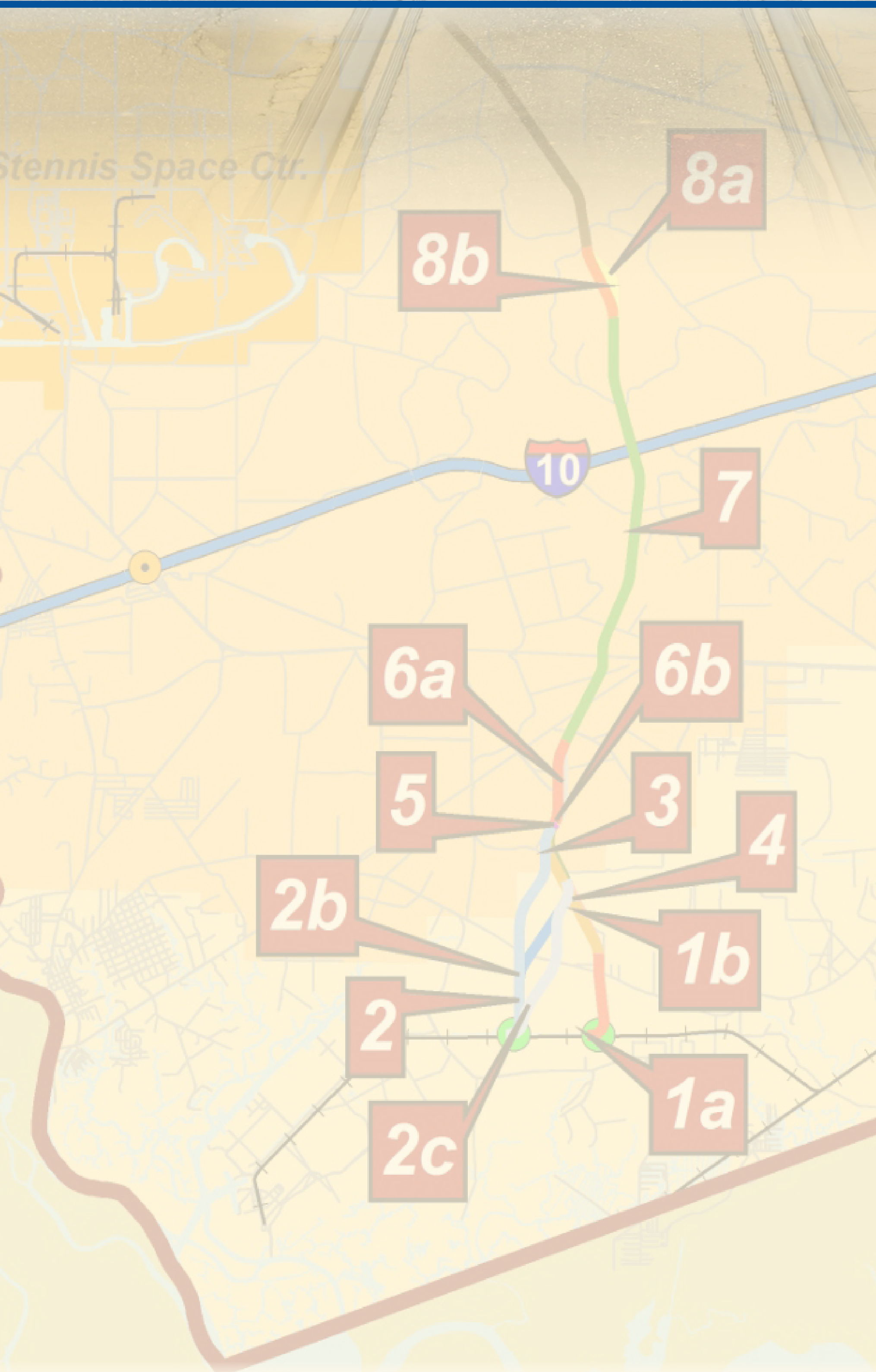
APPENDIX A: PORT BIENVILLE FEASIBILITY REPORT

PORT BIENVILLE

Rail Feasibility Study



Presented to:

Mississippi Department of Transportation

In collaboration with:

Federal Railroad Administration

Hancock County Port and Harbor Commission

September 19, 2013

CDM Smith

In association with HDR

Table of Contents

Figures

Tables

Executive Summary and Next Steps

The Port Bienville Railroad (PBVR), a short line railroad, provides rail services to the businesses in the Port Bienville Industrial Park and connects these rail users to CSX's east-west line along the Gulf Coast. The proposed rail line evaluated in this feasibility study would provide a connection between the PBVR and the Norfolk Southern (NS) rail line near I-59, north of Stennis Space Center. The connection would provide existing businesses access to dual Class I rail service, improving transit times and reliability of deliveries to customers. Dual Class I rail access would enable Hancock and Pearl River Counties to attract new industries to this region that require this level of rail services, creating new quality jobs and investment to help this area to continue to recover from recent disasters that have significantly affected their economies.

With the availability of dual Class I rail services, the businesses served by the proposed rail line are projected to generate 41,951 rail cars annually. The largest rail car user is currently trucking fracking sands mined in Hancock County to a drying facility in Pearl River County. The proposed rail line would allow this company to move a significant volume of their materials by rail rather than by truck, and could facilitate an expansion at this facility, creating additional jobs and investment in Hancock and Pearl River Counties.

During the alternative analyses several corridors centrally located within the study area emerged as the least costly and least impacting. These corridors were evaluated by impacts to both the human and natural environments. All of the Reasonable Alternatives shared a common central corridor. However, two distinct corridors on the north end of the project and several corridors on the southern end were identified. To further define the Reasonable Alternatives, the study team divided the advanced corridors into 17 segments and engineered rail alignments centrally within each corridor. These segments represent a possible combination of 40 potential corridors. Cost estimates were developed for each segment. At this stage in the project, the alignments are considered conceptual and the estimates are preliminary. The total construction cost for the new PBVR was estimated between $86.8 million and $104.5 million (in 2013 dollars) depending on the combination of segments chosen.

Given the business case for dual Class I rail services, the demands of the existing and emerging business clusters in Hancock and Pearl River Counties, the future benefits to Stennis Space Center, the existing industrial land inventory, and the workforce and transportation assets supporting this region, the construction of this new rail line is strongly supported. Based on the feasibility of the project documented herein and in the supporting technical documents, it is recommended that the project proceed to Phase II of this study. Completion of Phase II will better position the project for access to federal construction funds. The scope of services previously developed for Phase II includes environmental studies and documentation, as well as preliminary design and other supporting efforts for development of the proposed railroad. The level of detail for the environmental studies to be undertaken should be determined at this time through consultation with Federal Railroad Administration (FRA), Mississippi Department of Transportation (MDOT) and the Hancock County Port and Harbor Commission (HCPHC).

Introduction

The Mississippi Department of Transportation (MDOT), in conjunction with Federal Rail Administration (FRA) and the Hancock County Port and Harbor Commission (HCPHC), has prepared this Feasibility Study for the location of a new railroad line to connect the Port Bienville Short Line Railroad, located at the Port Bienville Industrial Park, Hancock County, with the Norfolk Southern Railroad (NS) in the vicinity of Nicholson in Pearl River County. Connections to the John C. Stennis Space Center (SSC) and the Stennis International Airport were also evaluated. The Port Bienville Railroad (PBVR) would link to both CSX and NS main lines in Hancock County providing access to dual Class 1 rail service.

Study Area

The study area encompasses a portion of Hancock and Pearl River Counties. The study area is generally bounded by (the communities of) Nicholson and Kiln to the north, Port Bienville to the south, the Pearl River to the west and Stennis International Airport and SR 603/43 to the east, representing a study area of approximately 180 square miles (see Figure 1).

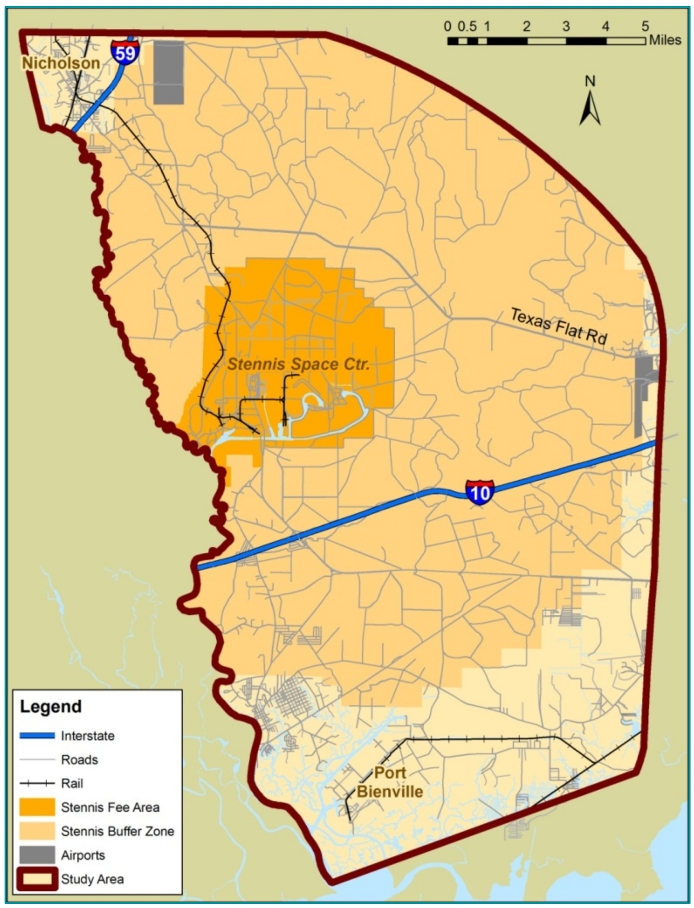


Figure 1 – Port Bienville Study Area.

The study area is bisected by Interstate 10, while Interstate 59 passes through a small portion of the study area in the north. Other significant features within the study area include wetlands, wetland mitigation banks, forests, mines, SSC, and a 125,000-acre acoustical buffer zone surrounding the SSC. This acoustical buffer makes up the majority of the study area. The two major facilities and key economic factors within the study area are Port Bienville Industrial Park and NASA's SSC.

Port Bienville Industrial Park **-** Port Bienville is a shallow draft (12 ft.) barge port in southwest Mississippi, located off the Intracoastal Waterway near mile marker 24 on Mullatto Bayou in Hancock County. The Port Bienville property encompasses approximately 3,600 acres, including an industrial park and the port facility. In 2008, the market area had a total population of 219,000 residents, with approximately 140,000 employees, and a gross regional product (GRP) of $9.7 billion.[1]

[1] Mississippi's Unified Long-Range Transportation Infrastructure Plan, pg 7

John C. Stennis Space Center **-** For more than four decades, the John C. Stennis Space Center (SSC) in Hancock County has served as NASA's primary rocket propulsion testing ground. Today, the center provides propulsion test services for NASA and the Department of Defense and the private sector. Stennis is home to NASA's Rocket Propulsion Test Program, which manages all of the agency's propulsion test facilities. State-of-the-art facilities, a seven-and-one-half-mile canal waterway system, and the 125,000-acre acoustical buffer zone that surrounds SSC enables delivery and testing of large-scale rocket engines and components.[2] Development within the acoustical buffer zone is governed by development restrictions purchased by the Federal Government. Some of the land within the buffer zone was purchased by the government but the majority of this property remains in private ownership subject to the development restrictions that do not allow any inhabitable buildings within the buffer area.

Approximately 5,000 employees work at the Stennis Space Center. Over the years, the SSC has evolved into a multidisciplinary facility that includes NASA research facilities and other resident agencies engaged in space and environmental programs and national defense, including the U.S. Navy's world-class oceanographic research community.[3]

Purpose

The purpose of the study is to determine the feasibility of constructing and operating a new rail line to connect the Port Bienville Short Line Railroad with the NS mainline in Nichols. This phase of the study includes the development of reasonable alternative corridors; identification of the economic benefits and opportunities associated with the proposed project; and the recommendation as to the feasibility of the project and the next steps taken, if appropriate.

There are three guiding principles (goals) for this project:

- First, any plan to locate the railroad must provide benefits for the Port Bienville Industrial Park, the Railroads, and the counties involved.
- Secondly, the railroad's location corridor must be compatible with the natural and human environment in Hancock and Pearl River Counties.
- Finally, MDOT anticipates a high degree of community and stakeholder involvement and participation throughout the process. The MDOT and the CDM Smith Team will be proactively engaged to ensure effective stakeholder involvement during the course of this study.

This study outlines the processes and criteria used in developing and evaluating the alternative corridors for the PBVR; provides a recommendation of the reasonable alternative corridors to be taken into Phase II of the project; identifies the economic benefits and opportunities; and recommends the next steps.

Regional Needs, Goals and Visions

Hancock and Pearl River Counties in Mississippi have been transformed by the impacts of Hurricane Katrina and the BP oil spill in the Gulf. Over the past few years, these counties have worked to recover from the economic consequences of these disasters. As identified in the various statewide planning documents, numerous infrastructure deficiencies exist within the study area. Some of the deficiencies identified are part of MDOT's long-range plan, 2035 MULTIPLAN, and are discussed below.

---

[2] NASA's John C Stennis Space Center Mission Brochure

[3] http://www.nasa.gov/centers/stennis/about/history/history.html, accessed 1/18/13

Mississippi's waterborne transportation is a critical component to the state's economy. Mississippi ports are located along the Gulf of Mexico, the Mississippi River, and the Tennessee-Tombigbee Waterway (Tem-Tom).[4] These ports connect the State to the nation's marine network and international trading lanes. By doing so, waterborne transportation is a critical component to Mississippi industries that ship and receive goods in today's global economy.[5]

The 2035 MULTIPLAN identifies planned improvements outlined in Port Bienville's 2010 Master Plan Update. Improvements included the development of a new rail connector from Port Bienville Railroad and NS near Picayune, Mississippi, provide a connection to Palmer Crossing and CN.[6]

Port Bienville is a shallow draft barge port and is one of four ports serving Mississippi's Gulf Coast. The port is located with the Port Bienville Industrial Park, a 3,600 acre site also served by the Port Bienville Railroad (PBRR) with multimodal connections to support the movement of goods nationally and internationally. PBRR currently provides shippers a connection to CSX, but there is not an existing connection to NS. Access to Norfolk Southern would provide dual Class I rail services improving the timeliness and reliability of deliveries to customers enable businesses served by these facilities to be more competitive in a broader market area. This additional rail connection would also be invaluable in the event of other natural disasters, enabling businesses and CSX to move equipment away from an impending disaster area, allowing for more rapid recovery if a disaster did occur. The Port of Gulfport is a deep-water port that serves container ships and barges. This Port has access to one Class I railroad and is planning improvements to rail to allow for increased container shipments. With the expansion of the Panama Canal in 2014, it is anticipated that the capacity of the Canal will more than double, impacting the amount of cargo and related logistics for shipments to Mississippi along the Gulf Coast.[7] If barges could be utilized to move some goods from Gulfport to Port Bienville this may allow Gulfport to accommodate additional cargo and deliveries.

Data Collection

In order to create a complete picture of the project area, it was necessary to compile a geographic information system (GIS) data for the study area in the following categories: environmental, cultural, historical, and infrastructure. The majority of data was downloaded from the Mississippi Automated Resource Information System (MARIS) website (http://www.maris.state.ms.us/).

Historical data was obtained from the Mississippi Department of Archives and History (MDAH) through the Department's website. Because the study area contains the SCC, it was necessary to submit a Freedom of Information Act (FOIA) request to obtain GIS data for areas inside the SCC complex boundaries. Current aerial photography for the study area was provided by MDOT.

The source water protection areas (SWPAs) data was obtained through a direct request from the Mississippi Department of Environmental Quality (MDEQ). This data is more accurate and current than the source water data available from the MARIS website.

[4] Mississippi's Unified Long-Range Transportation Infrastructure Plan, Final Report May 2011, MDOT, page 9

[5] Mississippi's Unified Long-Range Transportation Infrastructure Plan, Final Report May 2011, MDOT, page 11

[6] Mississippi's Unified Long-Range Transportation Infrastructure Plan, Final Report May 2011, MDOT, Appendix H, page 10

[7] Mississippi's Unified Long-Range Transportation Infrastructure Plan, Final Report May 2011, MDOT, Appendix H, page 10

Data for the existing wetland mitigation banks was compiled from three sources: the U.S. Army Corps of Engineers (USACE), MARIS, and Wetlands Solutions LLC. The USACE also provided data for proposed wetland mitigation banks.

With the exception of the mines layer, all of the GIS data were preexisting. Although there are a significant number of mines in the study area, there was no readily available GIS data layer showing their locations. The only available mine information was a list of mine locations containing township and range information obtained from the MDEQ. By using the list of mines, a township and range layer, a parcel layer and aerial photography, a new mines layer was created.

In addition to the GIS data and mapping, interviews were conducted with the owners or plant managers of 18 businesses in Hancock County, as well as several business leaders and business support organizations in Hancock and Pearl River Counties in Mississippi. These interviews were conducted to understand the region's economic development assets and opportunities, clarify local economic conditions from the business' perspective, and gain insight into transportation and supply chain issues, especially as they relate to the rail improvements proposed for Port Bienville.

Economics

Port Bienville Industrial Park and Stennis Space Center (SSC) have played a pivotal role in the recovery of this region, sustaining employment and attracting new investments and jobs that have helped to rebuild and enhance the area's economy. The proposed project would provide PBVR access to two Class 1 railroads. **Providing dual Class 1 rail access would generate immediate economic and transportation benefits for businesses in the Port Bienville Industrial Park and provide rail access to the Shale Support Services facilities in Hancock and Pearl River Counties trucks 84,000 tons of fracking sands each month from Hancock County to a rail spur in Picayune.** The proposed rail connector would repair and upgrade a portion of an inactive rail line and re-establish rail access to a transload facility previously developed for SSC, providing rail services to other companies in the region. Improvements and repairs to the NS line that previously served SSC could facilitate access to rail transportation for existing research and development businesses within SSC and provide an additional transportation mode that may be important to attract future operations and development.

The economic development benefits and opportunities identified in this study make a compelling argument for pursuing this project. Consider the following:

- Industrial parks providing dual Class 1 rail services are a scarce resource in the U.S. There are significant industrial projects that require access to dual rail service to meet the transportation demands of these operations. This study identified only seven industrial parks or logistics centers in the U.S. that currently provide dual Class I rail services. Access to two Class 1 railroads would position Hancock County and the Port Bienville Industrial Park to be included in this group of "crown jewel" industrial parks.
- Currently there are two industrial prospects evaluating sites in Hancock County. Both prospects require access to dual Class 1 rail service and the decision to proceed with this rail connector project would keep Hancock County in the running for both of these facilities. Based on information from the Mississippi Development Authority, these prospects indicate they would invest slightly over $650 million in plant and equipment and employ 450 people.
- Existing businesses in the Port Bienville Industrial Park currently utilize 6,261 rail cars annually. Based on interviews with existing companies and information from the Mississippi

Development Authority (MDA), the rail car usage on the Port Bienville Short Line Railroad could increase significantly given access to dual Class 1 railroads (see Table 1 below). The largest projected rail car user, Shale Support Services, is currently trucking fracking sands from Hancock County to its drying facility in Picayune. Additional product lines are planned for this facility in the near future if dual rail access are available, and the Phase II expansion planned for 2014 would move 168,000 tons (1,680 rail cars) of material monthly from the Hancock County facility.

Table 1 - Projected Rail Car Volumes with Dual Class 1 Rail Services

Current Annual Rail Car Volume for Existing Port Bienville Industrial Park Tenants	6,261 rail cars
Future Additional Annual Rail Car Volume for Existing Port Bienville Industrial Park Tenants	3,530 rail cars
Projected Annual Rail Car Volume for MDA Industrial Prospect	12,000 rail cars
Projected Annual Rail Car Volume for Phase II (2014) Shale Support Services facility in Hancock County	20,160 rail cars
Total Projected Annual Rail Car Volumes for Existing Industries and MDA Industrial Prospect	41,951 rail cars

Access to dual Class 1 rail services would result in a significant increase in rail volumes for the PBVR. This increased rail car usage may generate additional revenues that could be utilized to support a portion of the debt service for construction of this rail line. For more information on additional funding resources, please see the Economic Development Benefits and Opportunities Analysis (appended as a reference).

The potential economic benefits and opportunities generated from the construction of the proposed rail line providing dual Class I rail services for Port Bienville include:

- Studies document that facilities with access to more than one rail provider often realize 30 to 45 percent lower rail rates than those paid by captive production facilities. The proposed rail connector could produce transportation savings for businesses in the Port Bienville Industrial Park, SSC, Pearl River Industrial Park, and other businesses with access to this rail line, enabling these companies to be more competitive and increase sales and production, creating additional employment and investment in Hancock County.[8]
- Currently 1,200 people are employed in the Port Bienville Industrial Park. Based on information from the industries in the park, companies anticipate hiring up to 450 new employees over the five-year period following the completion of the proposed PBVR to meet increased customer demand.
- The most significant long-term economic development benefits and opportunities from this rail connector will result from additional employment and new investment in plant and equipment from existing businesses and the location of new companies that require or would benefit from access to dual Class 1 rail services. Hancock County has over 6,640 acres of industrial land available for lease or sale, including 3,600 acres available for lease within the SSC complex. The Hancock County Port and Harbor Commission (HCPHC) has also identified a 1,500-acre site near the existing industrial park for future expansion. Pearl River County has 505 acres of industrial land. With this substantial industrial land inventory, access to dual Class 1 rail services, the highway, airport, and port transportation infrastructure serving this area, Hancock County could

[8] "Analysis of Freight Rail Rates for Chemical Shippers," American Chemistry Council

meet the site location requirements of a significant number of the mega-projects and major industrial facilities that have located in the U.S. over the past 10 years.

- Exports to Latin America are increasingly important for businesses, particularly as Central and South America's economic performance "remains the world's second best performing region after Asia."[9] Businesses in the Port Bienville Industrial Park already export products to a number of Latin American countries and most anticipate greater opportunities for exports to this region within the next two years.

The Business Case for Dual Class 1 Rail Service in Hancock County

For businesses that ship or receive heavy or oversized materials or large quantities of materials, freight rail can be significantly more cost-effective than other transportation modes. While cost factors are important, businesses today increasingly utilize transportation strategies to achieve competitive advantages that enable them to meet delivery requirements because customers want the product when, where, and how they choose. Goods movement is, therefore, an increasingly crucial part of a company's competitiveness strategy. Reliable transportation services and speeds to market have become significant differentiators for many businesses. While cost is always important, other critical factors such as on-time deliveries and reliability, also influence a customer's purchasing choices.

The critical importance and benefits of dual Class 1 rail services in the U.S. can be readily demonstrated by the companies who have made and continue to make investment choices to locate or expand significant industrial facilities, and consider access to dual Class 1 railroads an essential "go/no-go" criteria in their site selection evaluation. Major manufacturing facilities normally require access to two Class 1 railroads in their site location criteria, and the locations these companies ultimately selected met that requirement. Additionally, these types of facilities would employ over a thousand people at higher than average manufacturing wages, and because of the substantial investment in plant and equipment they provide significant contributions to local and state tax revenues.

In addition, rail-served industrial parks are a relatively scarce resource, and industrial land with dual rail services is considered the "crown jewel" in the industrial development profession. An intensive search of available industrial parks or logistics centers found only seven industrial parks or mega-sites in the U.S. that currently provide dual Class 1 rail services. Sites like Port Bienville that can meet the requirements outlined below are extremely scarce:

- Availability of utilities;
- Accessibility to transportation services (at least one four-lane highway);
- Dual Class 1 rail services on site or within reasonable proximity of the site; and
- Property currently zoned for industrial uses and available "for sale" with an established pricing structure.

The Port Bienville Industrial Park provides access to a single Class 1 railroad; sufficient utility infrastructure for water, wastewater, electrical service, natural gas, and broadband; a workforce catchment area with a growing population and skilled labor; and excellent industrial training and educational facilities. The transportation network serving this area provides access to I-10 and I-59; proximity to

---

[9] "Latin American Outlook 2012: Recovering the Potential," Moody's Analytics, and "Growth in Latin America Moderating but Resilient," International Monetary Fund: Regional Economic Outlook, October, 2012

Stennis International Airport with an 8,500 foot runway and terminal and air cargo facilities; a barge port with access to the Gulf of Mexico via a navigable channel to the Pearl River; and 8,645 acres of land available for development.[10] As one former MDA official stated, "Port Bienville Industrial Park is the best deal for the dollar of any location around; you've got rail, barge, and highway access plus available land."

Business Competitiveness and Dual Rail Infrastructure

New transportation infrastructure enables businesses to take advantage of additional capacity and modify their logistics and supply chains, improving delivery services to their customers. The proposed PBVR will allow companies in the park to modify supplier networks, which may reduce their costs or enhance the quality of inputs. Access to dual Class 1 rail service can improve transit times, provide alternative response options in the event of natural disasters, increase transportation service levels, and provide access to broader markets and more customers – all of which are critical to a company's ability to successfully compete in an international marketplace. It is not easy to quantify the benefits that can result from the addition of another Class 1 railroad; however, the information below can provide some insight into the impact of some of these benefits.

A number of Port Bienville businesses are engaged in the polymers and plastics industry, which is considered part of the chemical sector. Chemical producers reported that 73 percent of their facilities with inbound rail transportation are captive to a single railroad. "When these companies compared their captive and non-captive facilities (those facilities with access to more than one railroad provider) and considered comparable volumes, distances, and services, they estimated that on average rail rates for their captive production facilities are 30 percent higher."[11]

Higher transportation costs have caused a number of these companies to source raw materials to off-shore locations and to site new production facilities in areas "based on access to competitive rail services".[12] Transportation costs and service conditions have caused some companies to decide to forego expanding their U.S. facilities, to shut down a line of production, or to close a facility and increase production in another country. The American Chemistry Council estimates that if the premium on chemical shipments was reduced, then the chemical sector could create up to 25,000 additional American jobs with $1.5 billion in new wages and $6.8 billion in new economic output.

The Business Case for Hancock County Businesses

In September and October of 2012, interviews were conducted with owners or plant managers of 18 businesses in Hancock County as well as several business leaders and business support organizations in Hancock and Pearl River Counties in Mississippi. These interviews provided an understanding of the region's economic development assets and opportunities; clarity of local economic conditions from the business' perspective; and insight into the transportation and supply chain issues, specifically as they relate to the rail improvements proposed for the Port Bienville Industrial Park.

---

[10] Includes total undeveloped acres owned by HCPHC, existing industrial park tenants, property within the secure fee area at Stennis Space Center, remaining acreage at the Airport Industrial Park, industrial sites in Pearl River County, and a future industrial site adjacent to Port Bienville Industrial Park.

[11] "Analysis of Freight Rail Rates for Chemical Shippers," American Chemistry Council, conducted by Veris Consulting, Inc. 2012

[12] Ibid

Eleven of the businesses surveyed are located at Port Bienville Industrial Park in western Hancock County. The companies at Port Bienville Industrial Park employ over 1,200 people, providing significant job opportunities for the county and the region. Of these eleven, seven are engaged in manufacturing and research and development involving plastics, chemicals, and metals. Several of these companies are owned by major global firms. Three businesses provide logistics services including shipping and warehousing, and one is part of a large nationwide firm that leases and repairs rail cars.

The remaining seven companies or agencies interviewed are located at SSC in Hancock County. SSC is home to a number of federal and state agencies and aerospace and defense contractors. The firms interviewed are involved in research and development, manufacturing, and testing of equipment and devices used in scientific research, defense, aerospace, geospatial technology, and space systems. The companies employ federal and military staff as well as a number of civilian workers from Hancock and surrounding counties. Over 5,500 people work at SSC, and it is a major contributor to the economy of the County and the region.

The businesses interviewed generally viewed Hancock and Pearl River Counties as a desirable location for business. Owners and managers mentioned the area's reasonable taxes, quality community, supportive business environment, and strong workforce as assets. The companies interviewed at the industrial park expect their business employment to remain stable or to increase over the next few years despite recent economic constraints, and a few are considering significantly expanding capacity or adding new product lines if more competitive transportation services become available. All of the manufacturing firms surveyed cited access to multiple modes of transportation as a significant factor in their decision to locate in Hancock County and an ongoing benefit to their existing operations and future expansion plans.

The industrial park is located near Interstate10 and Interstate 59, with excellent highway access. It is positioned between major seaports in Mobile, AL and New Orleans, LA. Additionally, Port Bienville Industrial Park is accessible by barge via the Pearl River. The airport at Gulfport, MS is within a 45-minute drive and New Orleans International Airport is also within a reasonable distance. The Stennis International Airport provides general aviation services as well as air cargo facilities, and is also utilized by the military for training operations.

A number of companies in the Port Bienville Industrial Park currently export finished goods to international customers in Mexico, Brazil, Peru, Panama, and Canada. Most of the businesses interviewed were aggressively working to expand their customer base and were actively engaged in efforts to export their products to new markets in the coming year. Rail access to ocean ports was critical to these efforts.

SSC does not have rail service at present, although rail was available in the past. The proposed alignment for the proposed PBVR would run east of the SSC facility and access to the proposed PBVR could be extended near the north gate. Three SSC businesses interviewed for this study identified that they are interested in shipping by rail, particularly if transportation rates are competitive for oversized loads.

The PBVR, a short line railroad serving the Port Bienville Industrial Park, offers rail access connecting the industrial park to CSX's east-west line. The PBVR received high marks from the businesses that utilize rail services for their customer focused operation, competitive rates, and dedication to working with companies to facilitate shipments and deliveries including working nights, weekends, and holidays to help businesses meet major customer needs. Port Bienville companies who currently use rail anticipate definite benefits from the proposed rail connector linking the industrial park to the NS rail line. For businesses located at Port Bienville, transit time and reliability of deliveries are critical. Rail shipments bound for Port Bienville now travel to Gentilly Yard in New Orleans via CSX and are then backhauled to Port Bienville. The additional time and distance adds to the cost of rail transport. The Gentilly Yard can be congested and it is not unusual for cars to take at least seven days to move from the yard in New Orleans back to Port Bienville. Transit times of 28 days have been documented by several businesses in the park.

Severe storms are also a threat all along the Gulf Coast. Companies with facilities at Port Bienville Industrial Park prior to Hurricane Katrina described how the storm impacted their operations. Though damage to buildings was extensive (requiring a complete rebuild in one case), damage to the CSX rail line, which caused the rail line to be out of operation for six months, was a more serious problem. Access to two rail lines could facilitate the movement of critical production equipment away from a pending disaster area, allowing these businesses to get back into production and put people back to work more quickly after a natural disaster.

Existing and Emerging Industries and Rail Transportation Dependence in Hancock County

Innovation is the linchpin for Hancock County's targeted growth sectors and continues to drive a significant number of existing industries as well. The HCPHC identified four major growth sectors for the community: aerospace and aviation, cargo-oriented development, polymers and advanced composite materials, and geospatial technology. In addition to these four target industries, manufacturing and exports continue to represent a significant opportunity for future growth.

Emerging Growth Industries in Hancock County

Aerospace and Aviation

A number of major aerospace and aviation companies are located in Hancock County, including: Rolls Royce, Pratt and Whitney, Raytheon Technical Services, and Lockheed Martin. SSC is also a world leader in rocket and jet engine testing; aerospace research, and satellite propulsion cores. The rockets that powered the Apollo Space Mission were developed and tested at SSC.

Cargo-Oriented Development

The State of Mississippi has identified six strategic freight corridors providing a range of freight infrastructure that best serve the freight needs of the state's existing and emerging industries.[13] The multimodal freight system that serves the state include the Gulf Coast and river ports, interstates and highways, Class 1 and short line railroads, airports, intermodal facilities, and pipelines. The Gulf Coast Multimodal Corridor shown in Figure 2 below has been designated as one of these six strategic freight corridors. Freight infrastructure in this corridor includes Port Bienville and the Ports of Pascagoula, Biloxi, and Gulfport. Rail and highway infrastructure includes CSX, NS, and KCS rail, as well as several short line railroads, Interstate 10, and U.S. Highways 90 and 49.

---

[13] *Mississippi Goods Movement and Trade Study*, prepared for Mississippi Dept. of Transportation, 2010

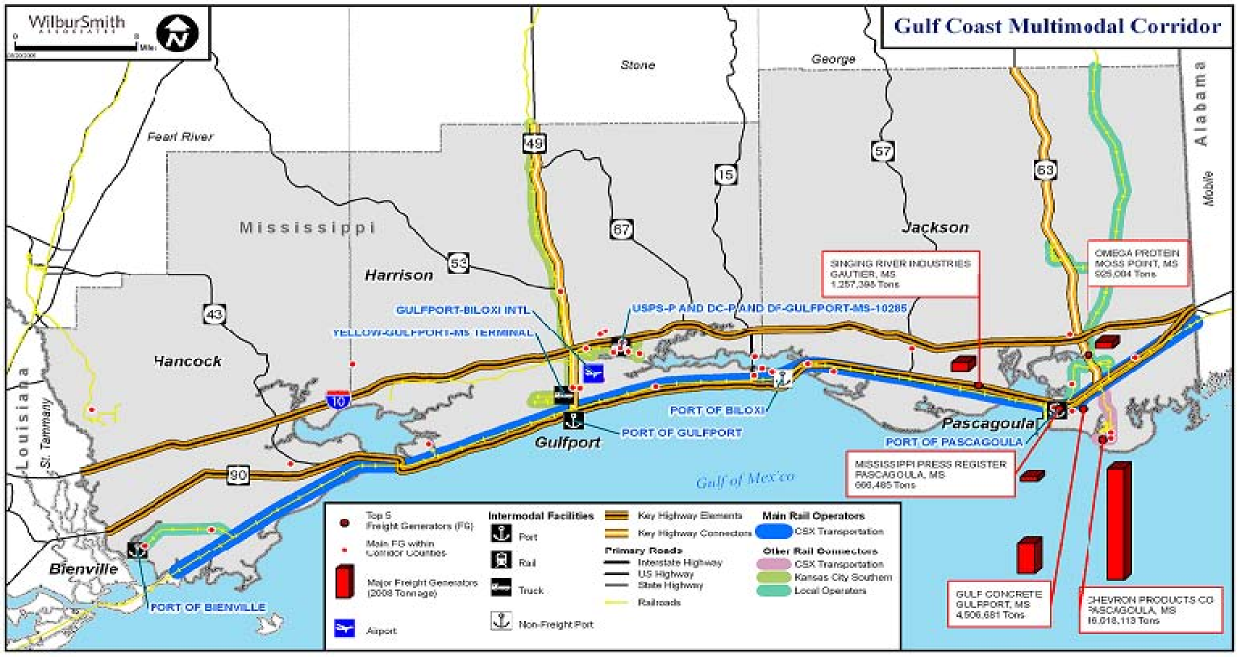


Figure 2 - Gulf Coast Multimodal Corridor

There are several specialized freight and logistics companies located in the Port Bienville Industrial Park and include Andersons, Inc., Anderson Rail Group, SSA/Gulf, and A & R Distribution. The existing transportation infrastructure within the Gulf Coast Multimodal Corridor and, more specifically, the unique transportation assets in the Port Bienville Industrial Park will continue to support the expansion of these companies in Hancock County. Access to an additional Class 1 rail provider would enhance this sector.

Polymers and Advanced Composite Materials

More than 400 plastics and polymer companies are located in Mississippi and over 100 of them are engaged in manufacturing chemicals. DAK Americas, Sabic Innovative Plastics, SNF/Polychemie, Calgon Carbon, and MAC LLC, all located in the Port Bienville Industrial Park, are engaged in polymer, plastics, and chemical manufacturing.

Geospatial Technology

Geospatial technology was essentially developed at SSC, building on geospatial research conducted by NASA, the Department of Defense, Department of Commerce, and the private sector. Geospatial products allow consumers, businesses, and governments to utilize geographic data in a variety of equipment and services, research facilities at SSC continue to provide new innovations in this industry. The U.S. geospatial industry generated approximately $73 billion in revenues and at least 500,000 well-paid jobs in 2011.[14]

Manufacturing and Exports

The 2013 Global Manufacturing Competitiveness Index recently identified ten key drivers of global competitiveness. Six of those drivers relate directly to the proposed PBVR:

---

[14] "Putting the U.S. Geospatial Services Industry on the Map," The Boston Consulting Group, December 2012

- Cost and availability of labor and materials
- Supplier networks
- Talent-driven innovation
- Physical infrastructure
- Economic, trade, financial and tax systems
- Government investments in manufacturing and innovation

In addition, manufactured goods account for 93.2 percent of Mississippi's exports and support over 317,900 trade-related jobs in the state.[15] Businesses in Mississippi exported $12.2 billion in goods and services in 2012.[16] The state's largest export market is Panama, followed by Canada, Mexico, China, Honduras, Colombia, and Brazil. Primary exports include petroleum, coal, chemicals, computer and electronic products, transportation equipment, and paper.

Sixty-four percent of the businesses in the Port Bienville Industrial Park are engaged in manufacturing and a number of agencies and contractors at the SSC are also involved in ongoing manufacturing, re-fabrication, or research and development activities that involve moving heavy, over-sized equipment and engines.

Transportation Dependence and Hancock County's Economy

An industry sector's dependence on transportation can be measured by examining the amount a business sector spends on transportation as a share of the total output of the sector.[17]

Key industrial sectors were evaluated to better understand the role freight and goods movement play in Hancock County and how multimodal transportation contributes to the economic vitality for this area. The evaluation was based on the non-governmental employment concentrations in the county that make up these key industrial sectors. Sixty-three percent of the non-governmental employment is concentrated in five industrial sectors: construction, manufacturing, wholesale and retail trade, and professional and technical services.[18] Figure 3 shows the breakdown of these employment sectors in Hancock County.

---

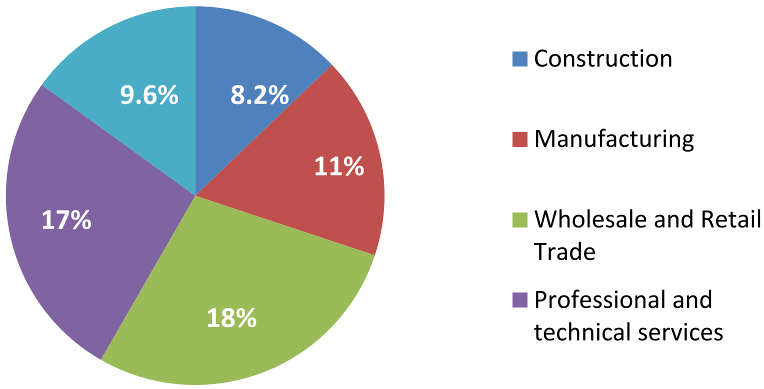
[15] Data from Bureau of Economic Analysis, Bureau of Labor Statistics, and USITC

[16] U.S. Department of Commerce, International Trade Administration, Office of Trade and Industry Information, February 2013 Report, and Mississippi Business Roundtable

[17] "Transportation Satellite Accounts: A Look at Transportation's Role in the Economy," U.S. DOT Research and Innovative Technology Administration

[18] Bureau of Labor Statistics

Figure 3 - Employment by Sector in Hancock County



Source: U.S. Census, Bureau of Labor Statistics

It was determined that Hancock County industries are most dependent on freight rail services including aerospace and aviation businesses; polymers, chemicals, and plastics; manufacturing; geospatial technology; cargo-oriented development; and retail and wholesale trade, as shown in Table 2.

Table 2 - Transportation Dependence Rating of Hancock County's Top Industries

Industry Sector:	Highways	Freight Rail	Waterways/Ports	Air	Transportation cost per dollar of output
Aerospace & Aviation	High	High	High	High	9%
Cargo-Oriented Development	High	High	High	Medium	9%
Polymers & Composite Materials	High	High	Medium	Low	9%
Geospatial Technology	High	Medium	Low	High	6.5%
Manufacturing	High	High	High	Medium	9%
Retail and Wholesale Trade	High	High	Medium	Low	6.5%

Industrial and Business Site Evaluation Factors

Economic development is a very competitive business. Understanding the critical factors that influence a company's decision to locate a new facility, or expand or retain an existing operation is a quintessential economic development activity. The economic prosperity of Hancock County and south Mississippi depends upon the businesses and industries within the region, and the ability to meet their unique requirements for workforce, land, transportation, utilities, and other services.

Over the past 26 years, a corporate site location study has been conducted to identify the most important factors affecting the location decisions of businesses, and to track these factors over time to assess evolving trends and conditions driving business location decisions.[19] Eleven of the 26 site selection factors identified related to the movement and accessibility of goods and people.

[19] Area Development Site and Facility Journal, "Annual Corporate Site Consultant Survey, 2012"

The eleven transportation and freight factors considered most important in the 2012 study include:

- Highway accessibility
- Availability (accessibility) of skilled labor
- Proximity (accessibility) to major markets
- Inbound/outbound shipping costs
- Proximity (accessibility) to suppliers
- Availability (accessibility) of unskilled labor
- Accessibility to major airports
- Raw material availability (accessibility)
- Proximity (accessibility) to technical college/training
- Railroad services
- Waterway or ocean port accessibility

These transportation factors, along with other competitive conditions, influence the site decisions that businesses make when locating, expanding, or consolidating operations. While freight rail transportation alone will not foster economic growth, improved freight services and connectivity, multi-modal transportation services, and competitive costs can significantly differentiate the region's economic environment, providing opportunities to attract and retain businesses and jobs for Hancock County and the region in the future. For some major industrial projects, access to two Class 1 railroads is essential.

The most significant benefits and opportunities generated from the proposal rail connectors would be derived from new employment and additional investment in plant and equipment by existing businesses and from the location of new companies that require or would benefit from access to dual Class I rail services. Hancock County currently has over 6,640 acres of industrial land available including 3,600 acres of land available within the SSC complex. Pearl River County has an additional 505 acres of industrial land available. This substantial industrial land inventory, coupled with the future access to dual Class I rail services and the existing multimodal transportation network servicing this area, meet the site location requirements of a number of significant industrial and business facilities that could locate in this region.

Alternative Analysis

The alternative selection process for any transportation facility begins with the identification and quantification of a "universe" of preliminary alternatives and selection of reasonable alternatives that address the project objectives. To evaluate preliminary alternatives, and then identify a selection of reasonable alternatives on this project's aggressive schedule, a streamlined selection process was developed in regard to the NEPA process. The streamlined screening and selection process incorporated GIS, an automated corridor analysis tool called the Alignment Alternatives Research Tool (AART), limited field reconnaissance and data validation, engineering design criteria, and review and evaluation by the project team that consisted of planners and engineers. The process also took into account and incorporated client input, public and other stakeholder comments and concerns, as well as consideration of previous studies. The process was iterative in nature, providing a continuous quantification and comparison of impacts to an equal level of detail at each stage associated with the various alternatives, as they are modified based on design criteria, cost, and other considerations during project development. The remainder of this report provides a detailed explanation of the process that was utilized to determine reasonable alternatives for the proposed PBVR corridor.

Methodology

As stated above, the selection process of the alternative corridors included the use of an automated tool to assist and accelerate the identification and evaluation of the preliminary alternatives. The AART is a series of GIS-based functions designed to route conceptual alignments among the various natural and human resources within a study area. The program allows users to interactively weight geographic features and attributes collected from public and project-derived databases.

Individual data layers are assigned rankings to provide criteria for the AART to create a path of least impact. Areas that are ranked low, such as less sensitive resources, would be used over a highly sensitive resource. Although the tool attempts to utilize the lower-ranked areas as much as possible, it also tries to minimize the overall length of the path/corridor. In some cases, AART may impact a few acres of highly-ranked areas if the overall impacts of the path are less than if those areas that are avoided.

Additionally, "avoid" areas can be included to effectively block any areas where the potential rail line should not be considered. Areas that have been set as avoids will be automatically avoided while locating a path that would minimize impacts to the remaining resources. The desired corridor width is then applied and the environmental and cultural impacts of the corridor are calculated. The AART will summarize the impacts for each alternative alignment and display a potential alignment for each model run.

Once all of the layers have been ranked or set as an avoid, the AART processes all of the layers and generates a single, composite "suitability" layer comprised of the highest rankings from all input layers. In other words, for each grid cell in the study area, the AART reviews each input layer, selects the highest value for that cell and assigns that value to the corresponding cell in the suitability layer Figure 4.

In summary, the "corridors" are developed through a simple "opportunities and constraints" approach. The tool finds the least-impact path between user-selected endpoints by attempting to stay away from high-ranked areas, while maintaining as short a path as possible between points.

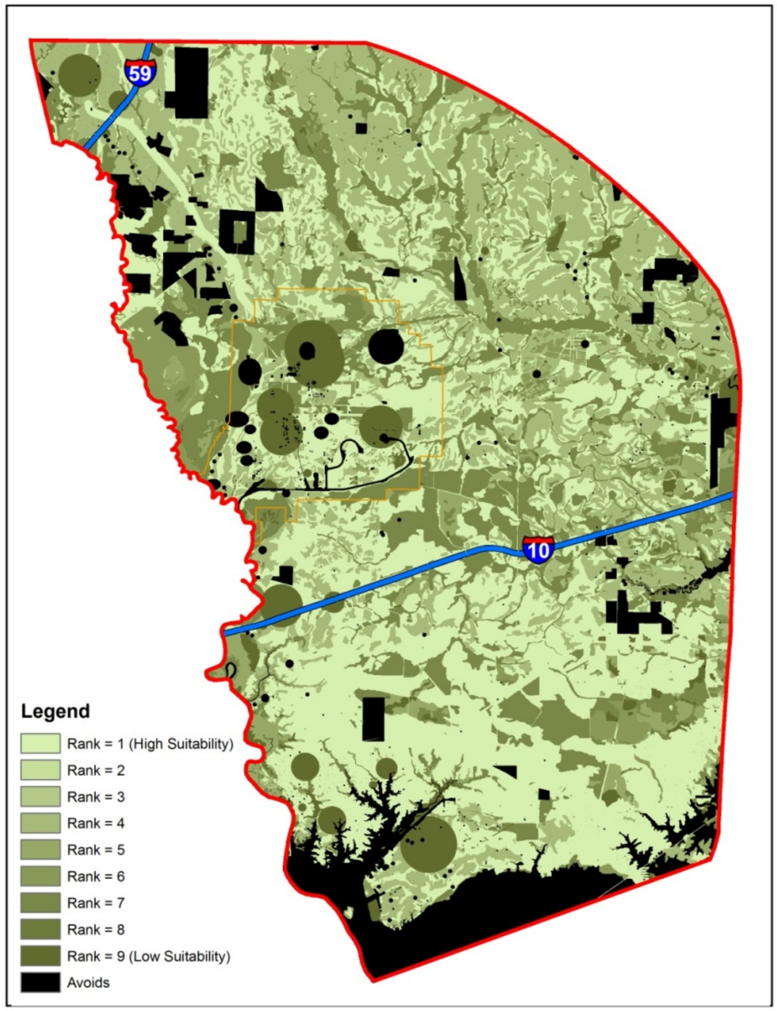


Figure 4 - Base Scenario showing rankings and avoids.

Generation of Conceptual Alternatives

Once the data was compiled, the rankings determined, and the endpoints chosen, the AART was ready to begin generating conceptual corridors. Various combinations of start, end and waypoints were developed in order to generate a number of corridor alternatives to evaluate.

As the conceptual corridors were generated, their locations and impacts were reviewed. In cases where the corridors would veer into unexpected areas, explanations were sought by investigating the data layers and their assigned rankings.

The AART generated an impacts report for each corridor detailing the cultural and environmental impacts for that corridor. The corridor locations and the impacts reports were used by the project team in the corridor evaluation process, along with factors such as future development and other intangibles. Staff experience and expertise in conducting corridor studies played an important part in the corridor review and evaluation process.

Once the initial AART developed alternative corridors were identified the refinement process began. Early on, numerous corridors were eliminated from further study for various reasons, as documented in the Rail Alternatives Development Technical Methodology Report (appended as a reference).

Engineered Alignments

After the initial round of cuts, several alternative corridors were identified from Scenarios 25, 26, USACE01, USACE02 , EPA03, EPA04 and EPA05 that were then further refined. By using the standard fixed-width corridors and the irregular corridors generated by AART, the study team was able to make slight adjustments to the alignments in order to meet the engineering design criteria for the proposed PBVR line. To assist the engineers make these adjustments, the AART also generated irregular pathways which identified the next-best areas for potential consideration of the alignment (see figure 5). These areas, while not as good as the least-impact corridor, were also worth considering and provided options for the design engineers.

Additionally, study team engineers also identified several new segments for consideration. These new manually-developed segments were derived by taking into account the irregular corridors as shown in Figure 5. These new alignments were developed with the intent to maintain minimal impacts to the environment where practical, while meeting the design criteria. These engineered alignments were then used to generate new 1,000-foot corridors centered about theses alignments. A new set of corridor impact reports was generated, and initial cost estimates for each corridor were prepared and compiled in a matrix format. Impacts were summarized based on the refined 1,000-foot wide corridors. However, the actual impacts for the proposed PBVR would be considerably less, probably 90% less, since the final constructed footprint of the rail bed is expected to be typically less than 100-feet in width. Detailed field investigations have not been performed yet and the 1,000-foot wide corridors will allow flexibility to adjust the alignment in the future to further minimize impacts once the detailed field work has been completed. The impacts within these 1,000-foot wide corridors and the initial cost estimates for the engineered alignments were used for comparing one alternative to another and further refinement.

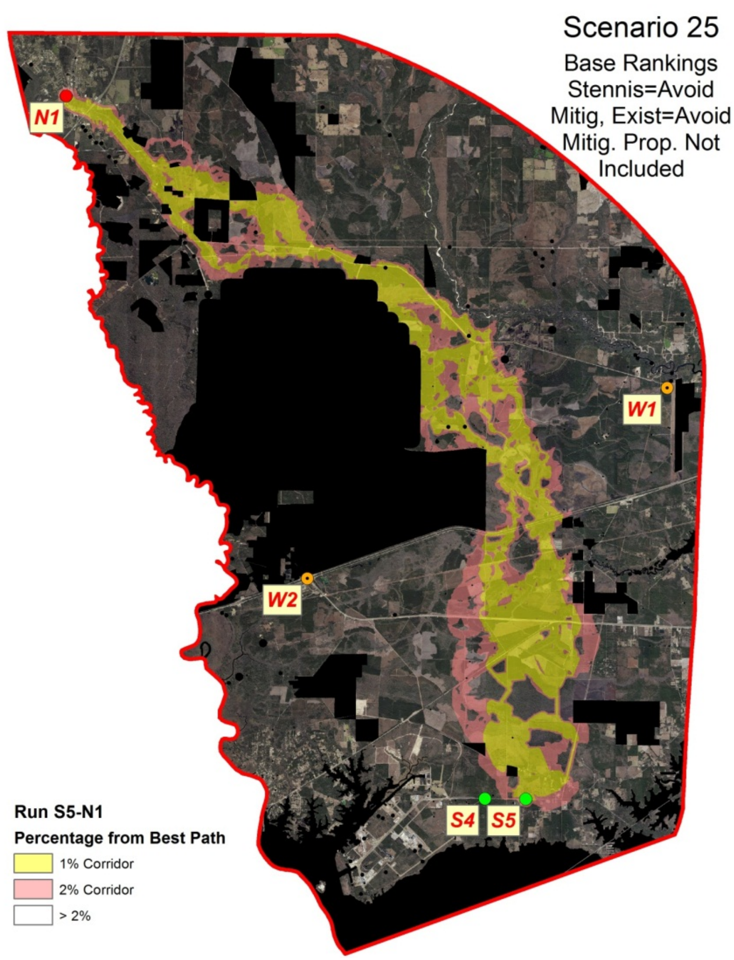


Figure 5 - Other potential corridors for run S5 to N1. These corridors depict "next-best" areas.

Reasonable Alternatives

Once the initial corridor matrix was completed and the comparison performed, several corridors centrally located within the study area emerged as the least costly and least impacting. Every one of these Reasonable Alternatives shared a common central corridor. However, two distinct corridors on the north end of the project and several corridors on the southern end were identified.

To further define the Reasonable Alternatives, the study team divided the advanced corridors into segments as identified in Figure 6. These 17 segments represent a possible combination of 40 potential corridors. Following the development of the segments, the study team re-quantified impacts and cost by segment, as shown in Table 3. Additionally, the costs estimates were further refined by taking into account the anticipated bridging of high-value wetlands and stream mitigation. These costs estimates are considered all inclusive and represent potential "implementation costs" which include final design, right-of-way acquisition, and construction and inspection services. The estimates are based on the true engineered alignments within each refined corridor and are representative of 2013 unit cost data derived from other rail projects and from cost experience on other similar projects.

At this stage in the project development the alignments are considered conceptual, therefore 20% contingencies have been included in the cost estimates. Table 3 contains the Segment Matrix for the Reasonable Alternatives. Depending on the combination of segments, the cost estimate of the project varies from $86.6million to $104.5 million.

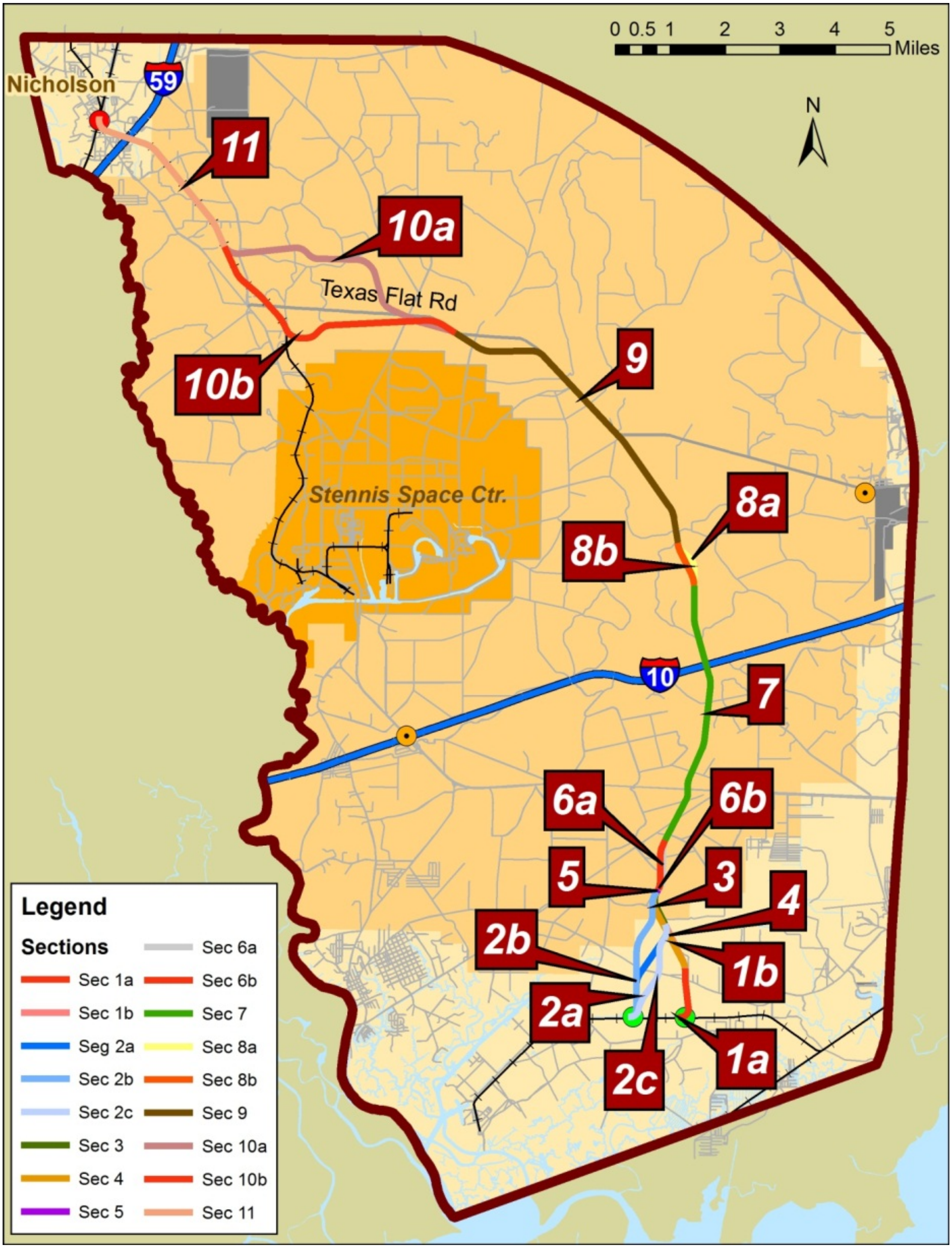


Figure 6 – Engineered alignments and section numbers

TABLE 3 - SEGMENT MATRIX FOR THE REASONABLE ALTERNATIVES
PORT BIENVILLE FEASIBILITY STUDY - PORT BIENVILLE TO NICHOLSON

CATEGORY		Unit of Measure	Segment 1a	Segment 1b	Segment 2a	Segment 2b	Segment 2c	Segment 3	Segment 4	Segment 5	Segment 6a	Segment 6b	Segment 7	Segment 8a	Segment 8b	Segment 9	Segment 10a	Segment 10b	Segment 11
ENGINEERING CRITERIA	Length	Miles	1.02	0.89	1.95	2.47	1.95	0.64	1.54	0.05	0.92	0.92	4.84	0.88	0.83	5.99	4.95	5.18	3.46
	Total Estimated Implementation Cost	$ Millions	2.10	1.60	3.80	9.20	3.90	5.50	7.10	2.90	7.90	2.10	20.10	1.60	1.50	26.30	24.60	23.60	5.70
NATURAL FEATURES	Wetland Impacts	Acreage	5	0	8	39	9	12	13	6	55	57	68	3	8	157	67	98	55
	Wetland Quality	Value	33	0	56	262	64	82	90	44	387	398	457	18	55	1,057	455	658	357
	Cost of Impacts to Wetlands	$60K per acre @ 10%	$12,600	$9,600	$22,800	$55,200	$23,400	$33,000	$42,600	$17,400	$47,400	$12,600	$120,600	$9,600	$9,000	$157,800	$147,600	$141,600	$34,200
	Devil's Swamp Mitigation Bank	Acreage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Proposed Texas Flat Mitigation Bank	Acreage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.52	0.00	0.00	0.00
	Cost of Impacts to Mitigation Banks	$120K per acre @ 10%	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$786,240	$0	$0	$0
	Length of Wetland Bridging	LF	0	0	0	430		430	430	283	587		596	0	0	1174	1469	1482	0
	Stream Crossings	# of Crossings	3	2	7	5	5	1	3	0	0	0	10	0	0	11	10	6	5
	HydroLine-Connector	Miles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.05
	HydroLine- Ditch	Miles	0.90	0.71	0.87	0.66	1.00	0.09	0.72	0.00	0.00	0.00	1.95	0.00	0.00	2.06	2.05	2.07	2.35
	HydroLine- Stream	Miles	0.00	0.00	0.40	0.40	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.32	0.45	0.91
	Stream/River - named	Miles	0.00	0.00	0.33	0.20	0.16	0.00	0.00	0.00	0.00	0.00	0.38	0.00	0.00	0.64	0.19	0.22	0.82
	Stream/River - other	Miles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	1.81	1.60	0.84	0.07
	Streams 303(d)	#	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.00	0.00	0.19	0.22	0.00
	Artificial Path	Miles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00
	Total Stream Impacts	Miles	0.90	0.71	1.60	1.26	1.27	0.09	0.72	0.00	0.00	0.00	2.64	0.00	0.00	5.22	4.16	3.58	4.19
	Total Stream Impacts	Feet	4,752	3,744	8,437	6,653	6,706	465	3,802	0	0	0	13,929	0	0	27,565	21,938	18,881	22,128
	Cost of Impacts to Streams	$200 per linear feet @ 10%	$95,040	$74,870	$168,749	$133,056	$134,112	$9,293	$76,032	$0	$0	$0	$278,573	$0	$0	$551,295	$438,768	$377,626	$442,570
MAN-MADE FEATURES	CERCLA	Acreage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.44
	Archaeological Sites	Acreage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.51	0.00	0.00	0.00
	Farmland (Prime)	Acreage	14.58	0.00	0.00	0.00	2.72	0.00	0.00	0.00	0.00	0.00	129.02	35.83	20.72	296.40	233.08	275.18	350.92
	Farmland (Prime if Drained)	Acreage	0.00	42.04	63.42	94.70	60.81	49.23	94.93	0.04	64.04	61.63	73.38	34.97	45.60	81.86	123.29	207.70	3.31
	Farmland (Statewide Importance0	Acreage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.92	1.99	0.00	0.00	2.72	0.00
	Mines	Acreage	0.00	0.00	0.00	5.78	2.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.24	36.26	28.50	4.22
	Recreational Facilities	Acreage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INFRASTRUCTURE	Water Wells	Acreage	0.00	0.00	0.00	0.67	0.20	1.02	0.67	0.78	0.72	0.72	3.61	0.00	0.00	0.00	0.72	1.28	4.10
	Transmission Line Crossings	#	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00
	Gas Line Crossings	#	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00	0.00	0.00

Agency Coordination and Public Involvement

An Agency Scoping Meeting was held on August 23, 2012 at the MDOT Administrative Building to introduce the Port Bienville project to the resource agencies. The goal of the meeting was to present the methodology for the feasibility study and verify the data to be used for analysis. The study team provided an overview of the project, the study area for the feasibility study and the Alignment Alternatives Research Tool (AART). The agencies were asked to review data and the associated criteria collected by the project team. Agencies provided their initial input on the available data. A demonstration of the AART tool was given to explain how the data would be used to identify rail corridors and the refinement process.

A Coordination meeting with the Stennis Space Center was held August 21, 2012. The study team provided an overview of the proposed PBVR, its objective, and the feasibility study. SSC representatives provided input on areas of the facility that would be unavailable for rail corridors.

A Public Information Meeting was held on October 16, 2012 from 5:00 – 7:00 p.m. in Bay St. Louis, MS at the St. Louis Public Library. The meeting was hosted by Mississippi Department of Transportation (MDOT) in cooperation with HCPHC, and was conducted in an open house format which invited the public to comment on the Feasibility Study for Port Bienville Railroad. Forty people attended the meeting.

An Agency Coordination Meeting was held on December 18, 2012 with resource and regulatory agencies. Representatives from MDOT, FRA, and HCPHC were in attendance. The study team provided a summary of the previous meeting and presented the results of the alternative corridors identified, including criteria used and the process used to analyze and refine the corridors. The presentation covered identification of the initial corridors, refinement of the corridors and the recommended reasonable alternatives.

cdmsmith.com

PORT BIENVILLE

Economic Development Benefits and Opportunties Analysis

Presented to:

Mississippi Department of Transportation

In collaboration with:

Federal Railroad Administration

Hancock County Port and Harbor Commission

September 19, 2013

CDM Smith

in association with HDR

Port Bienville: Economic Development Benefits and Opportunities Analysis

Table of Contents

Appendices

List of Figures

List of Tables

Port Bienville: Economic Development Benefits and Opportunities Analysis

Economic Development Benefits and Opportunities Analysis

Globalization and new technologies have transformed economies around the world, redefining the way businesses operate, challenging supply chains and transportation networks, and creating new customer opportunities in places where they were previously inconceivable. To compete in this global marketplace, businesses must optimize every asset: workforce skills, competitively priced products, and reliable transportation systems to ensure their customers receive quality goods and services when they expect them. As the importance of global trade and the demands of customers continue to evolve, American companies are more dependent than ever on integrated, agile, and efficient transportation networks to sustain and enhance their competitive position in the marketplace.

Hancock and Pearl River counties in Mississippi have faced transforming conditions as well in the past few years as they worked to recover from the effects of Hurricane Katrina and the oil spill in the Gulf, and the economic consequences of these disasters. The Port Bienville Industrial Park and Stennis Space Center played a pivotal role in the recovery of this region, sustaining employment and attracting new investments and jobs that have helped to rebuild and enhance the area's economy.

The Port Bienville rail connector evaluated in this study would link the CSX and Norfolk Southern (NS) main lines in Hancock County providing access to two Class 1 rail roads. The objective of this report is to examine the potential economic development benefits and opportunities resulting from access to dual Class 1 rail services in Hancock County. This project would generate immediate transportation benefits for businesses in the Port Bienville Industrial Park and provide rail access to the Shale Support Services facilities in Hancock and Pearl River Counties that currently truck 84,000 tons of fracking sands each month from Hancock County to a rail spur in Picayune. The proposed rail connector would repair and upgrade a portion of an abandoned rail line and provide rail access to a transload facility previously developed for Stennis Space Center that could provide rail services to other companies in the region. Improvements and repairs to the NS line that previously served Stennis Space Center could facilitate the return of rail services to some areas of the space center to serve existing operations and future development.

The economic development benefits and opportunities identified as a result of the consultant team's research, data analysis, and meetings with business and industry,

CDM Smith

Stennis Space Center, Mississippi Development Authority, and the Hancock County Port and Harbor Commission are compelling. Consider the following:

- Industrial parks providing dual Class 1 rail services are a scarce resource in the U.S. and certain significant industrial projects require access to dual rail service to meet the transportation demands of these operations. An analysis of industrial parks and logistics centers that provide dual Class 1 rail services and meet other minimal site criteria found only seven industrial parks or logistics center in the U.S. that currently meet those requirements. Access to two Class 1 railroads would position Hancock County and the Port Bienville Industrial Park in this group of "crown jewel" industrial parks.

- Currently there are two industrial prospects evaluating sites in Hancock County. One company is considering only one site in Mississippi, the Port Bienville Industrial Park site. Both prospects require access to dual Class 1 rail service. A decision to proceed with this rail connector project would keep Hancock County in the running for these two facilities. Collectively these prospects indicate they would invest slightly over $650 million in plant and equipment and employ 450 people.

- Existing businesses in the industrial park served by the Port Bienville Railroad currently utilize 6,261 rail cars annually. Based on information provided by these existing companies who would be directly served by this proposal rail line and information from the Mississippi Development Authority (who provided rail car usage data for an industrial prospect evaluating a location in Mississippi at the Port Bienville Industrial Park) the rail car usage on the Port Bienville Short Line Railroad could increase significantly with access to two Class 1 railroads. The largest projected rail car user, Shale Support Services, is currently trucking fracking sands from Hancock County to its drying facility in Picayune. Additional product lines are planned for this facility in the near future. If dual rail services were available to serve this company their Phase II expansion planned for 2014 would move 168,000 tons (1680 rail cars) of material monthly from the Hancock County facility.

  The projected rail car volumes anticipated with access to dual Class 1 rail services are as follows:

Table 1 Projected Rail Car Volumes with Dual Class 1 Rail Services

Current Annual Rail Car Volume for Existing Port Bienville Industrial Park Tenants	6,261 rail cars
Future Additional Annual Rail Car Volume for Existing Port Bienville Industrial Park Tenants	3,530 rail cars
Projected Annual Rail Car Volume for MDA Industrial Prospect	12,000 rail cars
Projected Annual Rail Car Volume for Phase II (2014) Shale Support Services facility in Hancock County	20,160 rail cars
Total Projected Annual Rail Car Volumes for Existing Industries and MDA Industrial Prospect	41,951 rail cars

The volume of rail cars projected in the table above represent a significant increase in rail volumes for the Port Bienville Short Line Railroad. According to CDM Smith rail experts, it is possible to accommodate this volume of rail cars on the proposed rail line however, additional rail planning and engineering will be necessary to define the infrastructure requirements and operating policies needed including additional sidings, signaling, and adequate interchange capacity at the yard. Also, this significant increase in rail car volumes for the Port Bienville Short Line Railroad could provide an opportunity to generate some revenues from rail connector operations to cover a portion of the debt service for construction of this rail line. Additional funding resources are in Appendix C.

- A number of studies document the economic benefits of non-captive industrial facilities (those facilities with access to more than one railroad provider) that realize, between 30 to 45 percent lower rail rates than those paid by captive production facilities. Additional research on non-captive rail impacts is included in the study. This proposed rail connector could produce similar transportation savings at the Port Bienville Industrial Park, Stennis Space Center, and Pearl River Industrial Park, enabling companies in the parks to be more competitive and increase sales and production, which can lead to additional employment and investment in Hancock County.[1]

- 1,200 people are currently employed in the Port Bienville Industrial Park. Based on the five-year business plans of the industries currently in the park, companies anticipate hiring as many as 430 new employees over the five year period following the completion of the proposal rail line to meet increased customer demand that could result from reduced delivery times, improved reliability, and lower transportation costs resulting from the availability of dual Class 1 rail service in the park. The industries in the industrial park have worked with the Hancock County Port and Harbor Commission for a number of years to help facilitate the construction of this proposed rail connector.

- The most significant long term economic development benefits and opportunities from this rail connector will be generated from new employment and additional investment in plant and equipment by existing businesses and the location of new companies that require or would benefit from access to dual Class 1 rail services. Hancock County presently has over 6,640 acres of industrial land available for lease or sale including 3,600 acres available for lease within the Stennis Space Center complex. The Hancock County Port and Harbor commission has also identified a 1,500 acres site near the existing industrial park for future expansion. Pearl River County has 505 acres of industrial land. With this substantial industrial land inventory, access to dual Class 1 rail services and the highway and port transportation infrastructure serving this area, Hancock County could meet the site location requirements of a significant number of the mega-projects and major industrial facilities that have located in the U.S. over the past ten-years.

- Exports to Latin America are increasingly important for businesses, particularly as Central and South America's economic performance "remains the world's second best performing

[1] "Analysis of Freight Rail Rates for Chemical Shippers," American Chemistry Council

region after Asia."[2] Businesses in the Port Bienville Industrial Park already export products to a number of Latin American countries and most anticipate greater opportunities for exports to this region within the next two years. The proximity of the Port Bienville Industrial Park to the Gulf Coast and Latin America coupled with the availability of multimodal transportation services, particularly dual Class 1 rail, were identified by nine companies as very important factors for their future export and business growth.

The Business Case for Dual Class 1 Rail Service in Hancock County

For businesses that ship or receive heavy or oversized materials or large quantities of materials, freight rail can be significantly more cost-effective than other transportation modes. While cost factors are important, businesses today increasingly utilize transportation strategies to achieve competitive advantages that enable them to meet delivery requirements because customers want the product when, where, and how they choose. Goods movement is, therefore, an increasingly crucial part of a company's competitiveness strategy. Reliable transportation services and speed to markets have become significant differentiators for many businesses. While cost is always important, other critical factors, such as on-time deliveries and reliability, also influence a customer's purchasing choices today.

The critical importance and benefits of dual Class 1 rail services in the U.S. can be readily demonstrated by the companies who have made and continue to make investment choices to locate or expand significant industrial facilities, and consider access to dual Class 1 railroads an essential "go/no-go" criteria in their site selection evaluation. Major manufacturing facilities including Toyota Motor Company North America, Severstall Steel Columbus, Katoen Natie, a Belgium plastics and petrochemical products firm that recently located in Louisiana, ThyssenKrupp Steel USA, Ford Motor Company, Sanyo Logistics, Volkswagen North America, and CenterPoint Logistics Center all required access to two Class 1 railroads in their site location criteria, and the locations these companies ultimately selected met that requirement. All but one of these facilities employ over a thousand people at higher than average manufacturing wages, and because of the substantial investment in plant and equipment they provide significant contributions to local and state tax revenues.

Consider, for example, the Boeing 7E7 site selection process for the Boeing Aerospace project now located in North Charleston, South Carolina. The transportation and freight criteria were key considerations in the site selection process for this project.[3] Boeing's transportation requirements included provisions of a suitable runway, proximity to a port capable of providing round-the-clock operations, continuous availability of heavy traffic-ways between the plant site and the port, and proximity to railways and interstate highways. The availability of dual rail infrastructure was also considered crucial to the recent expansion at the Port of Charleston.

---

[2] "Latin American Outlook 2012: Recovering the Potential," Moody's Analytics, and "Growth in Latin America Moderating but Resilient," International Monetary Fund: Regional Economic Outlook, October, 2012

[3] Boeing Corporation

Rail served industrial parks are a relatively scarce resource, and industrial land with dual rail services is considered the "crown jewel" in the industrial development profession.[4] An intensive search of available industrial parks or logistics centers found *only seven industrial parks or mega-sites in the U.S. that currently provide dual Class 1 rail services.* Properties were evaluated based on several criteria: availability of utilities, including at a minimum water, wastewater, and electrical utilities on site; accessibility to transportation services including at least one four-lane highway, and dual Class 1 rail services on site or existing rail on site connecting to two Class 1 railroads within reasonable proximity of the site; and property currently zoned for industrial uses and available for sale with an established pricing structure.

The seven industrial parks or mega-sites that currently meet those criteria are:

- *CenterPoint Intermodal Center, near Rochelle, Illinois*: access to BNSF and Union Pacific (UP), I-88 and I-39, with 338 acres remaining
- *Crawford Diamond Industrial Park, Nassau County, Florida*: 1,800 acre site zoned industrial, currently under development; FDOT road construction underway, utility improvements on site under contract
- *LogistiCenter, Logan, New Jersey*: access to NS and CSX rail, I-295 and I-95; 1,100 acre master planned business park with utilities and rail on site
- *CenterPoint Intermodal Center and Illinois Inland Port, Will County, Illinois*: approximately 3,200 acres remain of a 6,300 acre site, with access to UP and BNSF rail, I-55 and I-80; utilities on site
- *Riverport West, Paducah, Kentucky*: 1,200 acres available, access to BNSF and CN rail and I-69; Southland Renewal Fuels, a biodiesel facility, is being constructed on this site
- *Port of Montana, Butte, Montana*: access to BNSF and UP, I-15 and I-90; utilities on site; full-service river port
- *Frank C. Pidgeon Industrial Park, Memphis, Tennessee*: 1,436 acres with access to CSX and NS rail, I-40, and the Mississippi River Port

It is worth noting that several of these properties are logistics centers and while some manufacturers may be welcomed, several of these parks focus primarily on warehousing and distribution facilities. A limited number of greenfield sites also have access to two Class 1 railroads. However, these properties lack the necessary infrastructure, proximity to appropriate workforce, and other critical requirements to meet the general site selection criteria for a major industrial facility location at this time. Properties that can meet these requirements are extremely scarce.

> *"Port Bienville Industrial Park is the best deal for the dollar of any location around; you've got rail, barge, and highway access plus available land."*
>
> *- former MDA official*

The Port Bienville Industrial Park currently provides access to one Class 1 railroad; sufficient utility infrastructure for water, wastewater, electrical service, natural gas, and broadband; a workforce catchment area with a growing population and skilled

[4] Mark Sweeney, McCallum Sweeney Group, IEDC Industrial Site Location Panel 2010

labor; excellent industrial training and educational facilities; a transportation network that provides access to I-10 and I-59; proximity to Stennis International Airport with an 8,500 foot runway, terminal and hanger facilities, and air cargo facilities; a barge port with access to the Gulf of Mexico via a navigable channel to the Pearl River; suitable adjoining land uses that buffer future industrial development; and 8,645 acres of land available for development.[5] As one former MDA official put it, “Port Bienville Industrial Park is the best deal for the dollar of any location around; you’ve got rail, barge, and highway access plus available land.”

Prospective Industries in Hancock County

During the site selection process, negotiations with prospective companies are conducted in a strictly confidential environment. Limited information about two industrial facilities considering Port Bienville Industrial Park and Hancock County has been provided to the consultant team by Mississippi Development Authority and two site consultants with whom the team has worked previously. The anticipated investment from these two facilities would exceed $650 million dollars. Permanent long-term employment at these facilities is projected at 450 people, with approximately 500 employees anticipated during the construction phase. One prospect would utilize rail freight as the primary source for outbound shipment of finished products, with inbound materials delivered by water-based shipping for one project and a combination of barge and rail for the second project. These prospects will not consider a site without access to dual Class 1 rail services, and the only site in Mississippi these facilities are considering is in Hancock County. Without the commitment of dual rail access these facilities will not locate in Mississippi.

Business Competitiveness and Dual Rail Infrastructure

New transportation infrastructure enables businesses to take advantage of additional capacity and modify their logistics and supply chains, improving delivery services to their customers. The proposed Port Bienville rail connector will allow companies in the park to modify supplier networks, which may reduce their costs or enhance the quality of inputs. Access to dual Class 1 rail service can improve transit times, provide alternative response options in the event of natural disasters, increase transportation service levels, and provide access to broader markets and more customers – all of which are critical to a company’s ability to successfully compete in an international marketplace. It is not easy to quantify the benefits that can result from the addition of another Class 1 railroad; however, several research studies have sought to quantify the impact of some of these benefits.

In 2012, the American Chemistry Council released a study assessing the extent to which chemical companies rely on rail services, and how access to competitive rail services affected their business. A number of Port Bienville businesses are engaged in the polymers and plastics industry, which is considered part of the chemical sector. The

> *“…on average rail rates for captive production facilities are 30 percent higher.”*

[5] Includes total undeveloped acres owned by HCPHC, existing industrial park tenants, property within the secure fee area at Stennis Space Center, remaining acreage at the Airport Industrial Park, industrial sites in Pearl River County, and a future industrial site adjacent to Port Bienville Industrial Park.

companies participating in this study operate 677 major chemical production facilities in the U.S. Nearly 75 percent of these facilities rely on rail and a substantial number receive raw materials and ship chemical products by rail. Chemical producers report that 73 percent of their facilities with inbound rail transportation are captive to a single railroad. "When these companies compared their captive and non-captive facilities (those facilities with access to more than one railroad provider) and considered comparable volumes, distances, and services, they estimated that on average rail rates for their captive production facilities are 30 percent higher."[6]

Higher transportation costs have caused a number of these companies to source raw materials to off-shore locations and to site new production facilities in areas *"based on access to competitive rail services".*[7] Transportation costs and service conditions have caused some companies to decide to forego expanding their U.S. facilities, to shut down a line of production, or to close a facility and increase production in another country. The American Chemistry Council estimates that if the premium on chemical shipments were reduced the chemical sector could create up to 25,000 additional American jobs with $1.5 billion in new wages and $6.8 billion in new economic output.

The State of Montana, Governor's Office of Economic Development conducted a rail freight competition study to analyze the cost and benefits of investing in state-owned rail infrastructure to bring additional rail services to the state and promote reasonable rail freight competition and rates. The study found that areas of the state where multiple rail providers were located saw a substantial increase in jobs, higher market value for agricultural products and properties, improved business development, and significant improvement in on-time deliveries.[8]

A recent analysis of the benefits of dual rail access by the State of South Carolina found a number of benefits resulting from dual freight rail services, including:

- Ability to develop a single intermodal rail facility to equitably serve both Class 1 railroads, a more efficient and economical solution than constructing two separate facilities to serve the Port of Charleston
- Creating alternative routes for each Class 1 railroad in the event of an emergency or natural disaster to support disaster response for the railroad, businesses, and communities
- Expanding employment opportunities and development of land for businesses that need access to rail services

Washington State Department of Transportation conducted a strategic freight transportation analysis to document the impacts of modal competition on the shipment of Washington

---

[6] "Analysis of Freight Rail Rates for Chemical Shippers," American Chemistry Council, conducted by Veris Consulting, Inc. 2012

[7] Ibid

[8] "Rail Freight Competition Study," prepared for State of Montana, Office of Economic Development by R. L. Banks & Associates, Washington DC

agricultural products.[9] The study found significant benefits from competition in the market among transportation modes, including lower transportation prices, more options for customers, the ability to reach new and more distant markets, innovations in marketing and technology, and improved transportation services. Development of competitive rail alternatives generates a win-win-win, including shorter transit times for some commodities, more reliable transit times, and reasonably competitive rates.

In 2006 U.S. Department of Transportation conducted a comprehensive economic study, "Guide to Quantifying the Economic Impacts of Federal Investment in Large-Scale Freight Transportation Projects."[10] The study concluded that "supply chain benefits of an infrastructure investment that reduces direct transport costs by 30 percent also has the potential to reduce a company's operating cost by an additional 1.5 percent."[11]

The Business Case for Hancock County Businesses

In September and October of 2012 the consultant team interviewed the owners or plant managers of 18 businesses in Hancock County as well as several business leaders and business support organizations in Hancock and Pearl River counties in Mississippi. Through these interviews the team sought to understand the region's economic development assets and opportunities, clarify local economic conditions from the businesses' perspective, and gain insight into transportation and supply chain issues, especially as they relate to the rail improvements proposed for Port Bienville Industrial Park. A copy of the business stakeholder interview guide is included in Appendix F.

Eleven of the businesses surveyed are located at Port Bienville Industrial Park in western Hancock County. The companies at Port Bienville Industrial Park employ over 1,200 people, providing significant job opportunities for the county and the region. Of these eleven, seven are engaged in manufacturing and research and development involving plastics, chemicals, and metals. Several of these are owned by major global firms that rank highly within their respective industries. Three businesses provide logistics services including shipping and warehousing, and one is part of a large nationwide firm that leases and repairs rail cars.

The remaining seven companies or agencies interviewed are located at Stennis Space Center in Hancock County. Stennis is home to a number of federal and state agencies and aerospace and defense contractors. The firms interviewed are involved in research and development, manufacturing, and testing of equipment and devices used in scientific research, defense, aerospace, geospatial technology, and space systems. The companies employ federal and military staff as well as a number of civilian workers from Hancock and surrounding counties. Over 5,500 people work at Stennis, and it is a major contributor to the economy of the county and the region.

---

[9] "Value of Modal Competition for Transportation of Washington Fresh Fruits and Vegetables," Kenneth Casavant and Eric Jessup

[10] "Guide to Quantifying the Economic Impacts of Federal Investments in Large-Scale Freight Transportation Projects," U.S. DOT, 2006

[11] Ibid

The businesses interviewed generally viewed Hancock and Pearl River counties as a desirable location for business. The majority of the firms in the Port Bienville Industrial Park have been there more than five years, and two of the newer firms were started by employees of other firms located there. Owners and managers mentioned the area's reasonable taxes, quality community, supportive business environment, and strong workforce as assets. A few noted a lack of skilled workers for specific technical requirements, though several have created their own training programs to offset this potential challenge and were very pleased with the resulting technical workforce. One manager mentioned that it can sometimes be difficult to compete with the high wages offered by the oil companies in the region. The companies interviewed at the industrial park expect their business employment to remain stable or to increase over the next few years despite recent economic constraints, and a few are considering significantly expanding capacity or adding new product lines if more competitive transportation services become available.

All of the manufacturing firms surveyed cited access to multiple modes of transportation as a significant factor in their decision to locate in Hancock County and an ongoing benefit to their existing operations and future expansion plans. The industrial park is near I-10 and I-59, with excellent highway access. It is between the major seaports in Mobile and New Orleans, and Port Bienville Industrial Park is accessible by barge via the Pearl River. The airport at Gulfport is within a 45 minute drive and New Orleans International Airport is within a reasonable distance as well. The Stennis International Airport provides general aviation services as well as air cargo facilities and is also utilized by the military for training operations. One firm mentioned proximity to the Port of New Orleans as a definite advantage because of the port's familiarity with materials handling requirements for chemicals. Finally, the Port Bienville Railroad, a short line railroad serving the industrial park, offers rail access connecting the industrial park to CSX's east-west line. The short line received high marks from the businesses that utilize rail services for their customer focused operation, competitive rates, and dedication to working with companies to facilitate shipments and deliveries including working nights, weekends, and holidays to help businesses meet major customer needs.

Stennis Space Center does not have rail service at present, although rail was available to this site in the past. The proposed alignment for the new rail connector would run east of the Stennis facility, and access to the proposed rail connector could be extended near the north gate. Three Stennis businesses interviewed for this study are interested in shipping by rail, particularly if transportation rates are competitive for oversized loads. One firm ships by truck now, and the size of the equipment they produce requires expensive special handling. Each piece is fifteen feet wide; not only is this considered a wide load for highway travel, but bridge height clearances can be an issue. Shipping by rail could be less expensive. A second company ships very large and very heavy items by flatbed truck, but has used rail in the past. Timing and cost were mentioned as critical factors in their transportation decisions. The third company also ships large components by truck, but says rail could be a viable option for them as well if it were available. They also noted they were aware of other research contractors that would be more inclined to move facilities to Stennis if rail were available.

Seven of the eleven businesses interviewed at Port Bienville Industrial Park are current rail users, and two own their own rail cars. One company is involved in specialty fabrication, and their customers are located throughout the U.S. Customer destinations are different for each job, but they use rail when it offers the best combination of cost and delivery time. Several park businesses are major rail users, relying on rail for both incoming raw materials and outbound shipments. Companies also use a combination of the modes available within the park: truck, rail, and barge. Several businesses receive products that come by container ship, often to the Port of New Orleans, and then the product travels to or from Port Bienville by rail, barge, or truck to the Port of New Orleans. A number of companies in the industrial park currently export finished goods to international customers in Mexico, Brazil, Peru, Panama, and Canada. Most of the businesses interviewed were aggressively working to expand their customer base and were actively engaged in efforts to export their products to new markets in the coming year. Rail access to ocean ports was critical to these efforts. One of the companies interviewed may ship their products to South American customers via barge from the port in the future.

Port Bienville companies who currently use rail anticipate definite benefits from the proposed rail connector linking the CSX in the industrial park to the Norfolk-Southern rail line. Four companies who do not use rail presently would consider doing so if costs were more economical and shipments and deliveries were more reliable. A logistics firm in the park could gain new business if direct rail-to-barge transfer were feasible. Two companies that use rail now could do so much more economically and efficiently because many of their customers are served by Norfolk-Southern. Another firm currently trucks inbound shipments, but would use rail if they could access Norfolk-Southern because some of their suppliers are served by NS. This same firm sends most of its finished product overseas, and previously used rail-to-ship for outgoing freight. However, they now use trucks and barges because the rail service available at present costs more and shipments take longer to reach their customers. Dual Class 1 access would allow them to make logistics decision based on speed to market factors. One company that currently trucks outbound products because rail is not available could move materials destined for Mexico, South America, and other U.S. markets via the CSX line.

Two firms noted they are currently at a disadvantage because companies they routinely bid against have access to multiple rail providers and thus have more competitive transportation costs and better delivery times. Access to a second Class I rail line could result in lower costs and better delivery schedules, improving their ability to compete. For many businesses at Port Bienville, transit time and reliability of deliveries are critical. Rail shipments bound for Port Bienville now travel to Gentilly Yard in New Orleans and are then backhauled to Port Bienville. The additional time and distance also adds to the cost of rail transport. The Gentilly Yard can be congested and it is not unusual for cars to take at least seven days to move from the yard in New Orleans back to Port Bienville. Transit times of 28 days have been documented by several businesses in the park.

One manufacturer ships its finished products throughout the U.S. via Burlington Northern Santa Fe, Union Pacific, and Norfolk Southern through Gentilly Yard. Their customer contracts include a $1.3 million penalty for delayed deliveries. Two years ago, this company was forced to hire hundreds of trucks to off-load a shipment in Gentilly Yard that was delayed there after being delivered from their plant in the Port Bienville Industrial Park. Their heavy, oversized steel products were shipped by truck to the customer to avoid incurring the $1.3 million penalty and the customer's dissatisfaction. As the company executive lamented, "if that happens again, we may have to rethink our overall production here. We just can't risk having to pay that penalty, those trucking costs, or having a major customer drop our business because we can't deliver on time." Dual Class 1 rail service could result in significantly improved reliability and improved delivery times helping area firms avoid such penalties.

Another company relies on shipments through Gentilly Yard for raw materials. If shipments are held up the plant is faced with a potential shut down in operations. This company has paid a premium of $39,000 to get just 25 cars moved from Birmingham to Port Bienville to avoid a disruption in their production line. Yet another firm has had to transfer materials from rail cars to trucks – and pay the extra transit cost – in order to meet customers' deadlines. Their logistics manager noted that "this happens more than it should." A Port Bienville logistics firm mentioned that their production stops when rail cars are late or cannot be moved. Lack of timeliness is a serious issue for them.

Severe storms are a threat all along the Gulf coast, and six of the companies with facilities at Port Bienville Industrial Park prior to Hurricane Katrina described how the storm impacted their operations. Though damage to buildings was extensive, requiring a complete rebuild in one case, the damage to the CSX rail line which caused the rail line to be shut down for six months was a more serious problem. Until the rail line reopened, one company related that its shipments from Houston had to travel through Arkansas, Tennessee, and Alabama, tripling both delivery time and cost. Another firm shipped everything via truck after Katrina, which cost four times more and took twice as long. Katrina was a severe storm, of course, and it caused unprecedented damage. But several businesses were concerned that the CSX line was out for almost two months following tropical storm Isaac in September 2012. Access to two rail lines could potentially allow these businesses to get back into production and put people back to work more quickly after a natural disaster. One plant manager noted that had the proposed rail connector line been in place prior to Katrina, his firm possibly could have moved their rail cars and critical manufacturing equipment north to avoid the path of the storm; perhaps other firms and transportation providers could have moved their rail cars and equipment as well.

The existing industries at Port Bienville Industrial Park recognize the advantages of their current location and the improvements that could be realized if the proposed rail connector line were constructed. The potential for dual Class 1 rail services in Hancock County has also attracted the attention of several companies engaged in the site location process. These businesses are working directly with the Hancock County Port and Harbor Commission, the Mississippi Development Authority, and two site location consultants. Because of the extreme sensitivity and confidentiality of the site location process, limited information is available about the impacts that could result. However, these prospects require access to dual Class 1 rail service and will not consider a site that cannot meet that requirement within a specified time frame. Together these companies would invest over $650 million in plant and equipment and employ 450 people.

Existing and Emerging Industries and Rail Transportation Dependence in Hancock County

Innovation is an important key to future economic prosperity and competitiveness. In Hancock County's case, innovation is the linchpin of their targeted growth sectors and continues to drive a significant number of existing industries as well. The Hancock County Port and Harbor Commission identified four major growth sectors for the community: aerospace and aviation, cargo-oriented development, polymers and advanced composite materials, and geospatial technology. In addition to these four target industries, manufacturing and exports continue to represent a significant opportunity for future growth. The analysis below describes these economic drivers and the importance of freight rail to these businesses, and thus to the future of Hancock County. Relating these existing and emerging businesses to the transportation dependence of their associated business sectors underscores the critical relationship between Hancock County's economy and multimodal transportation.

Emerging Growth Industries in Hancock County

Aerospace and Aviation

According to the Aerospace Industries Association of America, aerospace sales in the U.S. reached a new high of $212.7 billion in 2010, and that upward trajectory continues.[12] A number of major aerospace and aviation companies are located in Hancock County including Rolls Royce, Pratt and Whitney, Raytheon Technical Services, and Lockheed Martin. These businesses are leaders in performance-based logistics, aerospace research and development, propulsion systems, and rocket engines. Stennis Space Center is a world leader in rocket and jet engine testing; aerospace research, satellite propulsion cores, and the rockets that powered the Apollo Space Mission were developed and tested here. Contractors in the three south Mississippi counties, Hancock, Harrison, and Jackson, won $20 billion in Department of Defense aerospace work from 2000 through 2010. The products shipped by these companies are often heavy, oversized loads requiring special handling and security during transport.

Stennis Space Center has anchored a growing number of aerospace and aviation companies in Hancock County and along the Mississippi Gulf Coast. Other aerospace and aviation companies in Hancock County include Applied Geo Technologies, Jacobs Engineering, Optech International Inc., and SELEX Galileo. Stennis is home to six aerospace research and applied technology centers, including the Engineering and Test Directorate and the Applied Science and Technology Project Office that uses satellites to assess the environmental health of coastal areas including the Gulf of Mexico. Engine testing for the Airbus manufacturing facility in Mobile will be conducted at Stennis Space Center as well.

The Mississippi Technology Transfer Center on the Stennis campus assists aerospace and aviation entrepreneurs in taking research from testing to commercially viable research and products. Technology transfer is also part of the mission of the Mississippi State University Science and Technology Center, which brings together four major research partners under one roof.

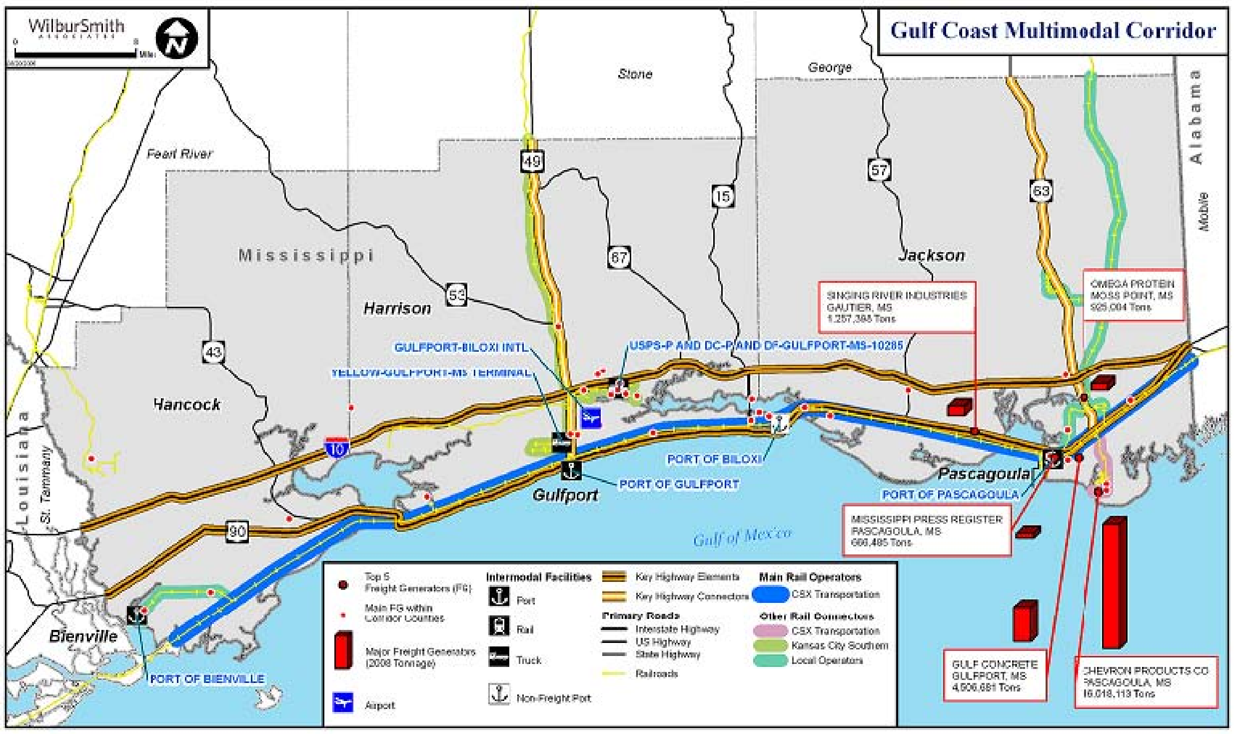
In addition to the aerospace and aviation activities at Stennis, the Stennis International Airport has become a center for military aviation testing and training and is also the home of the Joint Airborne Lidar Bathymetry Technical Center and a joint use agreement with Kessler Air Force Base. Sixty to seventy percent of the tower operations at this airport are military operations.

[12] Aerospace Industries Association, Aerospace Industry Report 2011

Cargo-Oriented Development

The State of Mississippi has identified six strategic freight corridors providing a range of freight infrastructure that best serve the freight needs of the state's existing and emerging industries.[13] The multimodal freight system that serves the state include the Gulf Coast and river ports, interstates and highways, Class 1 and short line railroads, airports, intermodal facilities, and pipelines. The Gulf Coast Multimodal Corridor shown in the map below has been designated as one of these six strategic freight corridors. Freight infrastructure in this corridor includes Port Bienville and the Ports of Pascagoula, Biloxi, and Gulfport. Rail and highway infrastructure includes CSX, NS, and KCS rail as well as several short line railroads, Interstate 10, and U.S. highways 90 and 49

Figure 1 Gulf Coast Multimodal Corridor



Cargo-oriented development includes distribution centers, port and inland port facilities, foreign trade zones (HCDC has secured a Foreign Trade Zone for Port Bienville), intermodal terminals, bulk or transload facilities (including an existing transload facility north of Stennis Space Center), hub terminals, and city terminals. Successful cargo oriented development depends upon available site and transportation infrastructure that meets the site selection needs of private industry, and ongoing policies that support the location of these types of facilities. Hancock County Port and Harbor Commission has made strategic choices and investments in order to create an environment that supports the operation of cargo-oriented facilities. Cargo or freight facilities can also be a catalyst for attracting other industries concerned about transportation

[13] *Mississippi Goods Movement and Trade Study*, prepared for Mississippi Dept. of Transportation, 2010

reliability, cost, and services. The critical site selection factors that cargo or freight facilities consider include the factors identified in the section beginning on page 20 of this report, and additional factors including:[14]

- Interaction with the transportation network
- Modal choice
- Permitting and regulatory environment
- Access to key markets

Several specialized freight and logistics companies are located in the Port Bienville Industrial Park. The Andersons, Inc. is part of a publicly traded company headquartered in Maumee, Ohio. The Anderson Rail Group ranks seventh among privately owned rail fleets in the U.S. GSD Logistics, LLC is a bonded warehouse providing warehousing, transloading, end loading, and pick-and-pack services. The company primarily handles soft goods and ships to several regions around the country. SSA/Gulf a third-party shipper, handles barge-to-truck shipments and transportation and warehousing for barge-to-warehouse-to-truck freight shipments. A & R Distribution provides bulk transportation and warehousing services including rail shipping.

The existing transportation infrastructure within the Gulf Coast Multimodal Corridor and, more specifically, the unique transportation assets in the Port Bienville Industrial Park support the continued expansion of this key growth sector in Hancock County. Access to an additional Class 1 rail provider would enhance this sector.

Polymers and Advanced Composite Materials

More than 400 plastics and polymer companies are located in Mississippi and over 100 of them are engaged in manufacturing chemicals. DAK Americas, Sabic Innovative Plastics, SNF/Polychemie, Calgon Carbon, and MAC LLC, all located in the Port Bienville Industrial Park, are engaged in polymer, plastics, and chemical manufacturing.

Plastics and polymer manufacturing is projected to continue to grow in the future at a rate of 3.5 percent annually.[15] Innovation and technology drives the polymer and advanced composite materials industry, accounting for a significant component of the sector's growth. Ford Motor Company and Oak Ridge National Laboratory have partnered to develop composite automobile body panels to reduce vehicle weight by as much as 25 percent. Advances in nanotechnology utilizing new composite materials, industrial biotechnology, and additive manufacturing – fabricating solid three-dimensional objects directly from digital models through depositing or "printing" – are driving this industry sector, now collectively valued at approximately $21 trillion.[16]

DAK Americas is a division of Alpek S.A. de C.V., one of Mexico's largest corporations. This company is the largest producer of PTA resin in the world. DAK manufactures food grade plastic pellets for a variety of uses, each with unique composite requirements depending upon the food

---

[14] NCFRP Project 23: "Economic and Transportation Drivers for Siting Freight Intermodal and Warehouse Distribution Facilities," for Transportation Research Board
[15] "Market Report: Plastics Industry Will Follow Manufacturing Growth," Mali R. Schantz, April 2012
[16] The Manufacturing Institute, "Facts about Modern Manufacturing," 2009

that will be stored. DAK is a significant rail user. Sabic Innovative Plastics has been in operation in Hancock County for over 31 years. The company manufactures plastic pellets that are shipped to customers around the world. This company is actively involved in developing new technologies and designing new products for their customers. SNF/Polychemie makes water-soluble polymers that are used in municipal and industrial wastewater treatment, in mining, and in oil field applications around the world. Reliable product delivery is crucial to their business model. MAC LLC is a new technology-based business developing polymer products for the military. Calgon Carbon is a specialty chemical business that develops and manufactures granulated activated carbon for use in water and air purification systems.

Geospatial Technology

Geospatial technology was essentially developed at Stennis Space Center, building on geospatial research conducted by NASA, the Department of Defense, Department of Commerce, and the private sector. Geospatial products allow consumers, businesses, and governments to utilize geographic data in a variety of equipment and services, research facilities at Stennis continue to provide new innovations in this industry. The U.S. geospatial industry generated approximately $73 billion in revenues and at least 500,000 well-paid jobs in 2011.[17]

Manufacturing and Exports

The 2013 Global Manufacturing Competitiveness Index recently released by Deloitte and the Council on Competitiveness identified ten key drivers of global competitiveness. Six of those drivers relate directly to the Port Bienville Rail connector project:

- Cost and availability of labor and materials
- Supplier networks
- Talent-driven innovation
- Physical infrastructure
- Economic, trade, financial and tax systems
- Government investments in manufacturing and innovation

International executives who participated in this study in 2013 ranked supplier networks as the fourth most important driver of manufacturing competitiveness; in 2010 supplier networks only ranked eighth. The increase in international business operations, expanding exports, and efforts to locate new production near emerging consumer markets have played a role in the increasing focus on moving goods cost effectively and reliably. Companies are investing in their supply chains to mitigate risks resulting from natural disasters, and to ensure greater control over deliveries to customers and more in-depth knowledge of material sourcing.

Physical infrastructure, which includes the infrastructure required for goods movement, ranked sixth in the 2013 competitiveness study. Research in the U.S. and other nations reveals physical infrastructure investment reduces costs and improves efficiencies in conducting business, boosts job creation, and fosters growth cycles within countries.[18]

---

[17] "Putting the U.S. Geospatial Services Industry on the Map," The Boston Consulting Group, December 2012
[18] "2013 Global Manufacturing Competitiveness Index," Deloitte LLP and the Council on Competitiveness

Manufacturing continues to be a vital part of the American economy. Manufacturing in the U.S. generated $1.8 trillion in gross domestic product (GDP) in 2011, or 12.2 percent of total U.S. GDP. The U.S. exported more than $1.3 trillion in manufactured goods, or more than 86 percent of all U.S. exports, in 2011.[19] Manufacturing firms employ nearly 12 million people, and for every direct manufacturing job an additional 1.6 jobs are created in research and development, trade, professional services, and transportation.[20] Manufacturing matters in the U.S. and in Mississippi because:

- Employees in manufacturing firms earn an average of $77,060 annually in pay and benefits, while average workers in all industries earn $60,168. This means manufacturing jobs pay, on average, 19.9 percent more than non-manufacturing jobs. [21]
- Manufacturing firms account for nearly two-thirds of all research and development in the U.S. and are a leading user of new technologies and processes.[22]
- Manufactured goods account for 86 percent of America's exports, and manufacturing is important to the reduction of our national trade deficit.
- Manufacturing has the highest multiplier effect of any economic sector; for every dollar spent in manufacturing another $1.48 is added to the economy, helping to stimulate economic growth.
- Mississippi's economy is intrinsically linked to its ability to move people, materials, components, and finished goods within the state and to national and international destinations.

Manufactured goods account for 93.2 percent of Mississippi's exports and support over 317,900 trade-related jobs in the state.[23] Businesses in Mississippi exported $12.2 billion in goods and services in 2012.[24] The state's largest export market is Panama, followed by Canada, Mexico, China, Honduras, Colombia, and Brazil. Primary exports include petroleum, coal, chemicals, computer and electronic products, transportation equipment, and paper.

Sixty-four percent of the businesses in the Port Bienville Industrial Park are engaged in manufacturing and a number of agencies and contractors at the Stennis Space Center are also involved in ongoing manufacturing, re-fabrication, or research and development activities that involve moving heavy, over-sized equipment and engines. PSL North America is an international company headquartered in India. The Port Bienville facility is the firm's only mill in North America. This high-tech operation manufactures steel pipe from 18 inches to 110 inches in diameter with up to one inch thick walls, at lengths up to 80 feet. The company builds piping for

---

[19] U.S. Department of Commerce, Bureau of Economic Analysis

[20] U.S. Department of Commerce, Economics and Statistics Administration, "The Benefits of Manufacturing Jobs," May 2012.

[21] Bureau of Economic Analysis, Industry Economic Accounts, 2011

[22] Brookings Institute, Metropolitan Policy Program, "Why Does Manufacturing Matter?" February 2012

[23] Data from Bureau of Economic Analysis, Bureau of Labor Statistics, and USITC

[24] U.S. Department of Commerce, International Trade Administration, Office of Trade and Industry Information, February 2013 Report, and Mississippi Business Roundtable

oil and gas transmission, water transmission, construction piping, and miscellaneous tubular products. They have a rail spur on site and ninety percent of their transportation is via freight rail.

Figure 2 - Queen City Tower

Manufab Inc. fabricates a range of steel products including beams for building, bridges, floodgates, trusses and other structural components. They built the architectural "tiara" (shown at left) on the top of the Queen City Tower in Cincinnati at their Hancock County location in Port Bienville Industrial Park.

Transportation Dependence and Hancock County's Economy

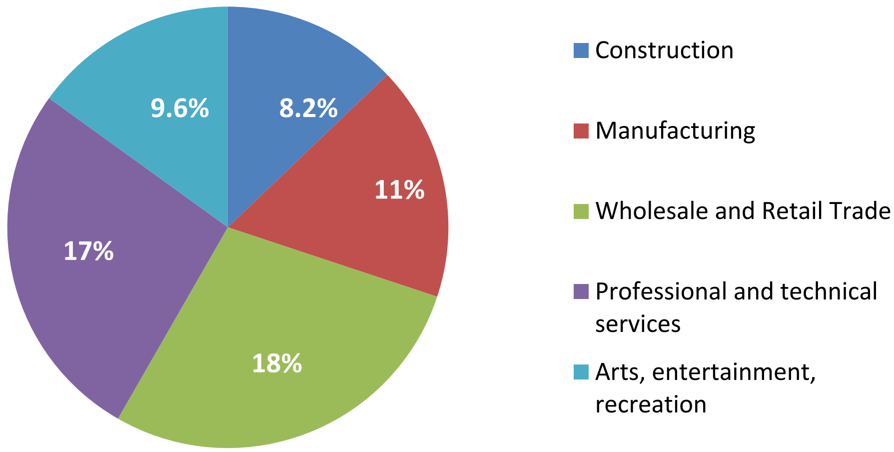
Freight transportation represents a key competitiveness factor for Hancock County. Businesses today compete not only on the basis of product quality and cost. The transportation networks that serve their facilities must provide reliable connections to customers and access to a multitude of markets, ensure timely deliveries of goods and services, and provide access for employees and customers. Some business sectors use transportation facilities and services more extensively than other sectors. An industry sector's dependence on transportation can be measured by examining the amount a business sector spends on transportation as a share of the total output of the sector.[25] *Transportation Satellite Accounts* provide national data about the amount spent on transportation per dollar of output for various sectors.

To better understand the role freight and goods movement play in Hancock County and the contribution of multimodal transportation to the economic vitality of the county's key industry sectors, the consultant team evaluated the importance of these key industrial sectors based upon the non-governmental employment concentrations in the county. Sixty-three percent of the non-governmental employment is in five sectors: construction, manufacturing, wholesale and retail trade, professional and technical services, and arts, food service, and entertainment.[26] Figure 3 shows the breakdown of these employment sectors in Hancock County.

[25] "Transportation Satellite Accounts: A Look at Transportation's Role in the Economy," U.S. DOT Research and Innovative Technology Administration

[26] Bureau of Labor Statistics

Figure 3 Employment by Sector in Hancock County



Source: U.S. Census, Bureau of Labor Statistics

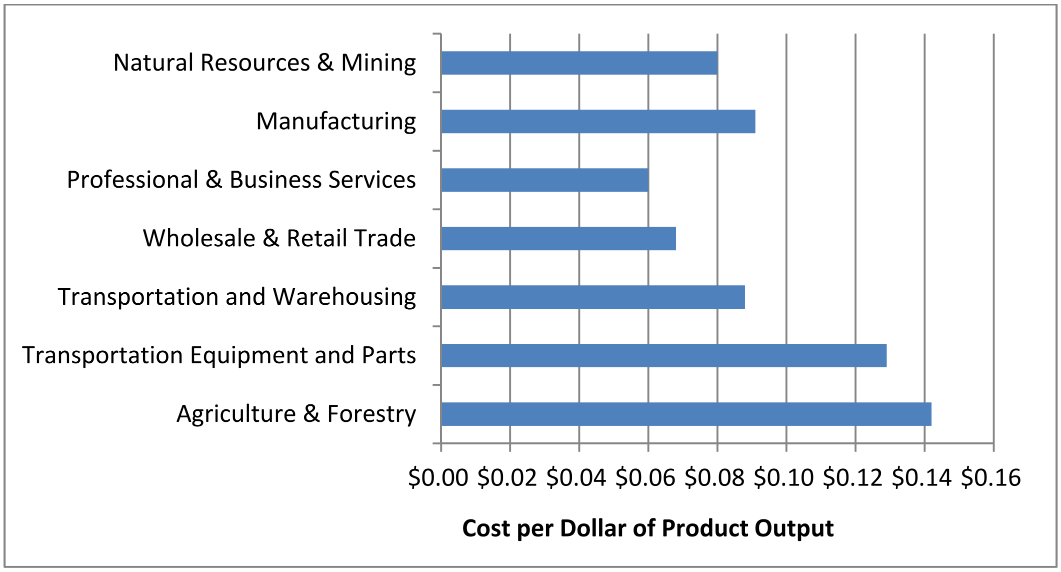
The importance of transportation to these key industry sectors can be measured by the amount spent on transportation by each sector as a share of its total output. *Transportation Satellite Accounts* provide a valuable method of measuring the transportation dependence of various industry sectors. In Hancock and Pearl River Counties the consultant team evaluated the following primary industry sectors and identified the corresponding industrial classification codes for each key sector to allow for a comparison of the applicable transportation costs per dollar of product output calculated from the *Transportation Satellite Accounts* research.

Table 2 North American Industrial Classification for Targeted Industrial Sectors in Hancock County

Hancock County Industrial Sectors	North American Industrial Classification Sector
Aerospace and Aviation	Manufacturing
Cargo-Oriented Development	Transportation and Warehousing
Polymers and Advanced Composite Materials	Manufacturing
Geospatial Technology	Professional and Technical/Manufacturing
Manufacturing	Manufacturing
Retail and Wholesale Trade	Retail and Wholesale Trade

Figure 4 shows the transportation cost per dollar of product output for several important existing industry sectors in Hancock County based on their North American Industrial Classification or NAICS code. Improvements in transportation costs and services would have a significant effect on a company's profitability. Lower transportation costs and more reliable service help reduce the cost of materials, and thus overall production costs. Reliable delivery of materials can enhance productivity, and reduced distribution costs to the consumer may also improve their competitiveness.

Figure 4 Transportation Cost as a Share of Sector Output (Transport Cost per $ of Product Value)



Source: *Transportation Satellite Accounts* Database, Bureau of Transportation Statistics, Research and Innovation Technology Administration

The transportation satellite account data indicates that Hancock County industries most dependent on freight rail services include aerospace and aviation businesses; polymers, chemicals, and plastics; manufacturing; geospatial technology; cargo-oriented development; and retail and wholesale trade, as shown in Table 3.

Table 3 Transportation Dependence Rating of Hancock County's Top Industries

Industry Sector:	Highways	Freight Rail	Waterways/Ports	Air	Transportation cost per dollar of output
Aerospace & Aviation	High	High	High	High	9%
Cargo-Oriented Development	High	High	High	Medium	9%
Polymers & Composite Materials	High	High	Medium	Low	9%
Geospatial Technology	High	Medium	Low	High	6.5%
Manufacturing	High	High	High	Medium	9%
Retail and Wholesale Trade	High	High	Medium	Low	6.5%

The transportation dependence of an industrial sector is just part of the overall business-transportation connection. As competition world-wide becomes more intense, businesses are exporting a diverse range of products to customers in more countries than ever before. *Export Nation*, a recent study from the Brookings Institute, found that:

- In 2008 over 11.8 million jobs in the United States were supported by the chain of export production including inputs and transportation.[27]

- Export intensive industries pay higher wages, and pay 1 to 2 percent higher wages even for workers without high school degrees.

- Export sectors generate multiplier impacts much greater than sectors that only produce for domestic markets. Gains from trade result in additional demand for products and services from outside the economic impact area.

- High-value-added products are more time sensitive and often higher in value. The cost for delays for these products is substantial, as one company in the Port Bienville Industrial Park knows. To avoid a $1.3 million delivery delay penalty the company incurred substantial costs to truck their products to the customer's dock door.

Reliability and speed to market were determined to be critical factors of competitiveness for 85 percent of the businesses in the Port Bienville Industrial Park. Dual Class 1 rail service would improve delivery time to customers and reduce potential delays to certain key markets, and has the potential to reduce transportation costs from 30 to 45 percent. Additional freight and economic data can be found in Appendix A.

Industrial and Business Site Evaluation Factors

Economic development is a very competitive business. Understanding the critical factors that influence a company's decision to locate a new facility or expand or retain an existing operation is a quintessential economic development activity. The economic prosperity of Hancock County and south Mississippi depends upon the businesses and industries within the region, and the ability to meet their unique requirements for workforce, land, transportation, utilities, and other services. Industrial site evaluation factors have evolved to reflect the changing demands of businesses and the global marketplace in which they compete.

Understanding the corporate site location process and the critical factors that businesses evaluate when making their decision about locating or expanding a facility is important to the evaluation of the potential economic development benefits and opportunities resulting from dual Class 1 rail services in Hancock County. Over the past 26 years a corporate site location study has been conducted to identify the most important factors affecting the location decisions of businesses, and to track these factors over time to assess evolving trends and conditions driving business location decisions.[28]

A significant percentage of the 2012 study participants represented manufacturing, distribution and logistics, and data and computer related services similar to the companies found in Hancock County. Eleven of the 26 site selection factors were ranked most important by businesses when

---

[27] John Tschetter, "Exports Support American Jobs," U.S. Department of Commerce, International Trade Administration, 2010

[28] Area Development Site and Facility Journal, "Annual Corporate Site Consultant Survey, 2012"

considering a new or expanded facility location related to the movement and accessibility of goods and people. The transportation and freight factors considered most important in the 2012 study include:

- Highway accessibility
- Availability (accessibility) of skilled labor
- Proximity (accessibility) to major markets
- Inbound/outbound shipping costs
- Proximity (accessibility) to suppliers
- Availability (accessibility) of unskilled labor
- Accessibility to major airports
- Raw material availability (accessibility)
- Proximity (accessibility) to technical college/training
- Railroad services
- Waterway or ocean port accessibility

These transportation factors, along with other competitive conditions, influence the site decisions that businesses make when locating, expanding, or consolidating operations. While freight rail transportation alone will not foster economic growth, improved freight services and connectivity, multi-modal transportation services, and competitive costs can significantly differentiate the region's economic environment, providing opportunities to attract and retain businesses and jobs for Hancock County and the region in the future. For some major industrial projects, access to two Class 1 railroads is essential.

Stennis Space Center and Port Bienville Industrial Park: Setting Hancock County Apart

Stennis Space Center and the Port Bienville Industrial Park represent two unique and important economic development assets in Hancock County. The businesses in the industrial park recognize the economic opportunities they could realize from improved access to customers, raw material sourcing, and lower transportation costs by taking advantage of an almost unprecedented array of modal assets in this park. The potential economic benefits and opportunities that could be realized from freight rail access to Stennis can best be evaluated by considering some of the research and manufacturing facilities currently in the center. As the military presence at Stennis grows, their freight rail needs should be considered as well.

Stennis Space Center

Stennis Space Center (SSC), a premier aerospace and technology facility, is located on a 13,800 acre site within a 125,000 acre acoustical buffer zone in Hancock County. Stennis is home to our nation's primary rocket propulsion testing facility, the largest concentration of oceanographers in the U.S., the National Date Buoy Center (NDBC), Lockheed Martin Mississippi Space and Technology Center, Rolls-Royce North America Outdoor Jet Engine Testing Facility, SAIC, NASA, Mississippi Enterprise for Technology Center, and a number of Department of Defense facilities.

The 2011 Economic Impact Study prepared by Mississippi State University estimated Stennis had an economic impact of $122 million on local government tax revenues.[29]

The original Norfolk Southern rail line that once served Stennis Space Center was built to support an ammunitions plant located on the site years ago and to facilitate the construction of the Stennis facility. Several of the federal installations in the center used rail when it was available. No rail service exists within Stennis today, although some of the original rail bed is in fair condition. Stennis has a rail cross-dock facility near Texas Flat Road that is no longer in use but is being maintained. Stennis has indicated a willingness to work with the region and the Port Bienville Short Line if the rail connector line is constructed to make this facility available for area business and industry. Additional information on Stennis industries can be found in Appendix E.

Port Bienville Industrial Park

The Hancock County Port and Harbor Commission began development of the Port Bienville Industrial Park and Port of Bienville in 1967. The industrial park infrastructure provides comprehensive transportation services via port and barge, freight rail, highway, and aviation services through the Stennis International Airport. HCPHC has 5,298 acres of industrial land available, one of the most substantial industrial land inventories in the state. Stennis Space Center has an additional 3,600 available acres.

Table 4 Hancock County Port and Harbor Commission Industrial Land

Site	Developable					Non-Developable Acreage[1]	Total Acreage
	Developed Acreage	Undeveloped Acreage			Subtotal		
		Held or for Lease	For Sale	Subtotal			
PB Industrial Park							
HCDC	25	1,165	620	1,785	1,810	164	1,974
Tenants	414	1,154	56	1,210	1,624	na	1,624
Subtotal	439	2,319	676	2,995	3,434	164	3,598
Other							
Airport	155	--	45	45	200	--	200
Hancock Co.	na	--	1,500	1,500	1,500	--	1,500
Subtotal	155	--	1,545	1,545	1,700	--	1,700
Total	**594**	**2,319**	**2,221**	**4,540**	**5,134**	**164**	**5,298**

Source: HCDC, Stennis, MDA, and CDM Smith discussions with local business leaders
[1]Includes roadway, rail right-of-way, and unusable marsh land

Transportation Infrastructure

Freight Rail

Hancock County is currently served by CSX, a Class 1 railroad. The rail interchange in the industrial park was recently expanded to handle up to 165 rail cars. Rail service for Port Bienville moving westbound from Mobile travels past the Port Bienville switch to the Gentilly Yard, and rail cars are then hauled back to Port Bienville. CSX will stop at Port Bienville on the east bound trip

[29] Dr. Charles A. Campbell, Professor of Economics, Mississippi State University, February 2011

from Gentilly to Mobile, but there is a significant extra charge to stop at Port Bienville on the west bound run.

The Hancock County Port and Harbor Commission operates a short line railroad from the CSX main line that runs along the Gulf Coast into the Port Bienville Industrial Park. The Port Bienville Short Line serves the rail transportation needs of the businesses in the industrial park.

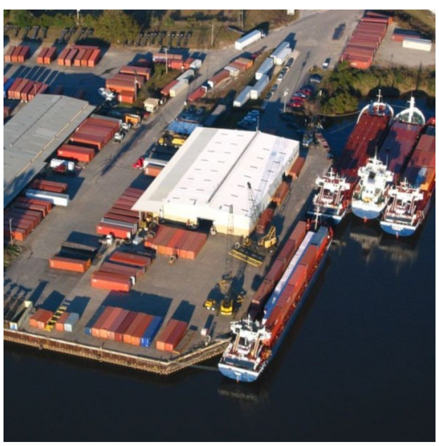
Highway Access

Port Bienville Industrial Park is readily accessible to I-10, providing interstate access to Houston, Mexico, and San Diego to the west, I-59 with direct access to New Orleans to the south, and I-24 and I-75 in the north to Chattanooga.

Air Cargo

Stennis International Airport is owned and operated by the Hancock County Port and Harbor Commission. This facility includes a 8,500 foot lighted runway, air traffic control tower, and instrument landing system within a 1,680 acre general aviation airport. Currently the facility is used by the military under a joint use agreement with Kessler Air Force Base, Naval Special Operations, for maintenance repair and overhaul, for corporate planes, and for general aviation users. Sixty to seventy percent of tower operations are military operations, and there are also non-tower military operations at night. Because of the buffer zone, night-time cargo delivery is possible.

The airport is a full-service fixed based operation with a new passenger terminal, aircraft fueling, hangar and tie-down space, aircraft maintenance, charter service, and other amenities provide by Million Air. Aircraft rescue and fire fight (ARFF) coverage is available on the field.



Port and Barge

The Port Bienville port/barge facility in Hancock County provides 600 feet of dock space with three primary berths, a 12-foot channel depth, 300 feet of additional berth and turn basin, and two new warehouses with a combined capacity of 110,000 square feet. The port is equipped to handle container and bulk or break-bulk shipments. The port is serviced by the Port Bienville Short Line Railroad that interchanges with CSX near Ansley, Mississippi. SSA, a logistics provider, brings coal for DuPont through the port.

Recommended Next Steps

The Economic Development benefits and Opportunities Analysis contained in the Port Bienville Rail Economic Feasibility Study, documents the demand for dual rail services that would be developed as a result of the proposal rail project. The businesses that could be served by the rail line proposed to connect Norfolk Southern and CSX Railroad are projected to utilized 41,951 rail cars annually. The largest projected rail car used is currently trucking fracking sands mined in

Hancock County to a drying facility in Pearl River County. The proposed rail line would enable this company to move a significant volume of their materials by rail rather than by truck and would facilitate an expansion at this facility creating additional jobs and investment in Hancock and Pearl River Counties. The limited availability of industrial sites providing access to dual Class I rail service and the growth within these transportation dependent business sectors further supports the demand for this rail project.

The most significant benefits and opportunities generated from the proposal rail connectors would be derived from new employment and additional investment in plant and equipment by existing businesses and from the location of new companies that require or would benefit from access to dual Class I rail services. Hancock County currently has over 6,640 acres of industrial land available including 3,600 acres of land available within the Stennis Space Center complex. Pearl River County has an additional 505 acres of industrial land available. This substantial industrial land inventory coupled with the future access to dual Class I rail services and the existing multimodal transportation network servicing this area meet the site location requirements of a number of significant industrial and business facilities that could locate in this region.

Given the business case for dual Class I rail services, the demands of the existing and emerging business clusters in Hancock and Pearl River Counties, the future benefits to Stennis Space Center, the existing industrial land inventory, the workforce and transportation assets supporting this region, the construction of this new rail line is strongly supported. Based on the feasibility of the project documented herein, it is recommended to proceed to Phase II of this study. The scope of services previously developed for Phase II includes environmental studies and documentation (NEPA) as well as preliminary design and other supporting efforts for development of the proposed railroad. The level of detail for the environmental studies to be undertaken should be determined at this time through consultation with FRA, MDOT and HCPHC. Accordingly the scope of services for Phase II should be revisited and revised if appropriate.

Appendix A: Concentrations of Freight and Economic Activity

This section of the report analyzes the concentrations of freight and economic activity in the counties and communities that would be served by the proposed connections from the Port Bienville Short Line Railroad to the NS in order to determine if these counties are among those most likely in Mississippi to benefit from this type of rail improvement. Two key indices were utilized to compare economic activity in Hancock, Harrison, and Pearl River County to that of an average county in Mississippi. The rail freight transportation intensity index compares concentrations of rail and rail dependent industry sectors in these key counties to an average Mississippi county. The economic preparedness index measures how economically ready an area is to take advantage of a major infrastructure improvement such as the proposed project.

Hancock Counties will host the proposed rail connector project and industries located in this county will be a major beneficiary. However, this rail infrastructure will provide economic opportunities that are most likely to benefit the counties adjoining Hancock County which include Pearl River and Harrison Counties. There are a number of studies that document the wider distribution of tangible economic development benefits for a multi-county region as a result of strategic investments in key infrastructure.[30] This analysis evaluates the regional benefits of this rail connector project. Harrison County is the second most populous county in Mississippi, Pearl River and Hancock Counties rank 12th and 18th in terms of population.[31] Each of these counties would benefit from the construction of this additional Class 1 rail access, collectively the region including all three of these counties would realize economic benefits as the analysis that follows will show.

What is the Purpose of the Indices Analysis?

The purpose of the indices analysis is to demonstrate to what extent the counties served by the proposed Port Bienville rail connector are likely to be a better location for this type of project than other counties in Mississippi. With limited transportation infrastructure funding, and particularly limited available funding for rail infrastructure, it is important that investments are made in locations that can best capitalize on such new infrastructure. This means locations where there is a strong concentration of existing rail activities and where businesses are present that can best take advantage of rail improvements. As discussed in other sections of this report, access to two carriers may reduce shipment costs by 30 percent over time and significantly improve speed to market to meet customer delivery demands. In addition, the project will provide enhanced reliability in the overall rail network serving the Mississippi Gulf Coast in the event of delays or disruption on the lines of one carrier. Thus it is important to consider Harrison County in the analysis.

---

30 "Distribution of Benefits from Regional Economic Development", Michael Danielson, Woodrow Wilson School of Public and international Affairs, Princeton University and "Making Sense of Clustering: Regional Competitiveness and Economic Development", Joseph Cartright, Brookings institute

31 2010 U.S. Census

Methodology

The rail freight transportation intensity index and the economic preparedness index rely on an analysis of several available datasets that measure levels of freight usage and economic activity. Comparative datasets are needed at both the state and individual county level. Both indices are composite indices making use of multiple data sets and aggregating results into one index. The following sections explain the methodology and components of each index in greater detail.

Rail Freight Transportation Intensity Index

The rail freight transportation intensity index consists of two parts: a rail freight movement component and a freight related employment component. The rail freight movement component takes into account rail tonnage, value, and carloads moving in and out of the counties under study as well as the same data for Mississippi as a whole. The freight related employment component takes into account employment in freight dependent industry sectors for the counties under study and the state of Mississippi.

Rail Freight Movement Component: The data used to calculate the rail freight movement component was obtained from Mississippi Transearch data used in other components of the overall project analysis. This included the following data:

- Inbound and outbound rail tonnage for Hancock, Harrison, and Pearl River counties as well as Mississippi as a whole

- Inbound and outbound rail value for Hancock, Harrison, and Pearl River counties as well as Mississippi as a whole

- Inbound and outbound rail carloads for Hancock, Harrison, and Pearl River counties as well as Mississippi as a whole

The steps taken to derive the rail freight movement component of the rail freight transportation intensity index are as follows:

1. For each of the data sets, the State of Mississippi value was divided by 82 (the number of counties in the state) in order to develop a county average for each of the Mississippi counties.

2. Values for the individual counties were compared to the statewide average county values to develop ratios for total rail tonnage, total rail value, and total rail carloads. These three sub-index ratios for each county were compared to the county average for Mississippi. For these ratios, a value of "1" indicates the county has the same value as an average county in Mississippi, a value less than "1" means the county has a lower than average value, and a value greater than "1" means the county has a greater than average value.

3. The individual sub-index ratios were combined with equal weighting to derive an overall rail freight movement index component for each county.

4. A three-county average value for Hancock, Harrison, and Pearl River counties was also calculated and compared to the statewide county average.

The values and results of the rail freight movement component are discussed below.

Freight Related Employment Component: The consultant team utilized data from the 2013 Woods and Poole CEDDS data set for the freight related employment component calculations. This data best captured the employment in the project area based on the study team's interviews and other research. To complete the analysis, comparable employment statistics were needed for each of the counties in the analysis and the State of Mississippi, which limited the potential data sources that were usable.

The freight related employment component compares employment concentrations in key industry sectors that are most reliant on freight movements. The employment sectors considered were:

- Construction
- Manufacturing
- Wholesale Trade
- Retail Trade
- Transportation and Warehousing

This index compares the aggregate employment in these sectors in project counties to the aggregate employment in these sectors in an average Mississippi county. The following steps were used to derive the freight related employment component of the rail freight transportation intensity index:

1. For each of the data sets, the State of Mississippi value was divided by 82 (the number of counties in the state) to develop a county average for each of the Mississippi counties.

2. The values for individual counties were compared to the statewide average county values to develop a ratio. This was completed for each of the employment sectors and for total employment. For these ratios, a value of "1" indicates the county has the same level of employment in these sectors as an average county in Mississippi; a value less than "1" means the county has lower than average employment in these sectors, and a value greater than "1" means the county has greater than average employment in these sectors.

3. A three-county average value for Hancock, Harrison, and Pearl River counties was also calculated and compared to the statewide county average.

The values and results of the freight related employment component are discussed below.

Rail Freight Transportation Intensity Index: As explained previously, the rail freight transportation intensity index combines the rail freight movement component and the freight related employment component. For the base index, the two components are weighted equally. A value higher than "1" indicates that a county or group of counties is more dependent on freight rail than an average Mississippi county and is thus a better location for potential rail investment.

The higher the index value, the greater is the location's potential dependence on rail freight compared to other counties.

Economic Preparedness Index

The economic preparedness index uses tax collection values as a measure of economic activity that would effectively support and benefit from new investments in infrastructure. There are three components to the economic preparedness index: sales tax component, income tax component, and property value component. All three components were calculated in a similar manner using data from the *2012 Mississippi Department of Revenue Annual Report.*

Sales Tax Component: The sales tax component was calculated using fiscal year 2012 sales tax data from the Mississippi Department of Revenue. It compares total sales tax collected in each of Hancock, Harrison, and Pearl River counties to the average amount of sales tax collected in an average Mississippi county. A ratio was calculated comparing the individual county collections to the Mississippi county average, with a value of "1" indicating that the county collects the same in sales tax as an average Mississippi county. An average of the three counties under study was also compared and indexed against the value of an average Mississippi county. The values and results of the sales tax component are discussed below.

Income Tax Component: The income tax component was calculated in a manner similar to the sales tax component using 2011 county income tax data from the Mississippi Department of Revenue. It compares total income tax collected in each of Hancock, Harrison, and Pearl River counties to the average amount of income tax collected in an average Mississippi county. A ratio was calculated comparing the individual county collections to the Mississippi county average, with a value of "1" indicating that the county collects the same in income tax as an average Mississippi county. An average of the three counties under study was also compared and indexed against the value of an average Mississippi county. The values and results of the income tax component are discussed below.

Property Value Component: The property value component was calculated slightly differently as data on total property assessment values were used instead of total property tax collected. Using assessed property values provides a more accurate comparison between jurisdictions, as individual jurisdiction property tax rates may vary due to local factors. The total property assessed values came from fiscal year 2012 data in the *2012 Mississippi Department of Revenue Annual Report*. This index component compares total property assessment values in each of Hancock, Harrison, and Pearl River counties to the total property assessment value in an average Mississippi county. A ratio was calculated comparing the individual county values to the Mississippi county average, with a value of "1" indicating that the county has the same total property values as an average Mississippi county. An average of the three counties under study was also compared and indexed against the value of an average Mississippi county. The values and results of the property value component are discussed below.

Economic Preparedness Index: The economic preparedness index then combines the sales tax, income tax, and property value components. For the base index, the three components were weighted equally. A value higher than "1" indicates that a county or group of counties has a stronger economic foundation than an average Mississippi county, and is thus a better than average location to build upon an infrastructure investment such as the proposed Port Bienville railroad connector. The values and results of for the economic preparedness index are discussed below.

Rail Freight Transportation Intensity Index – Analysis and Results

The rail freight transportation intensity index combines a rail freight movement component and a freight related employment component. Table A-1 contains the values used in calculating the rail freight movement component.

Table A-1 Rail Freight Movement Component Data

2006 Mississippi Rail Freight	Inbound	Outbound	Total	Index Value
Tonnage				
Hancock	11,190	227,384	238,574	**0.70**
Pearl River	199,886	104,380	304,266	**0.89**
Harrison	1,282,820	906,131	2,188,951	**6.42**
Three County Average	497,965	412,632	910,597	**2.67**
Other Counties	14,885,370	10,331,740	25,217,110	
MS Average County	199,747	141,093	340,840	**1.00**
MS State	16,379,266	11,569,635	27,948,901	
Value ($Millions)				
Hancock	$20.9	$533.8	$554.7	**1.71**
Pearl River	$165.2	$228.8	$394.0	**1.22**
Harrison	$424.1	$603.8	$1,027.9	**3.18**
Three County Average	$203.4	$455.5	$658.9	**2.04**
Other Counties	$10,334.8	$14,216.6	$24,551.4	-
MS Average County	$133.5	$190.0	$323.5	**1.00**
MS State	$10,945.0	$15,583.0	$26,528.0	
Carloads				
Hancock	364	3,980	4,344	**1.13**
Pearl River	2,120	1,080	3,200	**0.83**
Harrison	14,615	10,332	24,947	**6.50**
Three County Average	5,700	5,131	10,830	**2.82**
Other Counties	17,099	15,392	32,491	-
MS Average County	2249	1590	3839	**1.00**
MS State	184,427	130,375	314,802	

Source: Transearch Data. Note: The data for Harrison County outbound freight was not available. Estimated values were calculated by applying the ratio of state inbound to outbound freight to the Harrison County inbound freight values.

Table A-2 contains the summary rail freight movement component index values based on the data listed above.

Table A-2 Rail Freight Component Index Values

Location	Value
Hancock	1.18
Harrison	8.05
Pearl River	0.98
Three County Average	2.51

This data suggests that in terms of total rail movements Hancock County is slightly above average, the value for Harrison County is eight times that of an average Mississippi county, and Pearl River County is about average. Based on these indices, in addition to those in Hancock and Pearl River counties, industries in Harrison County can benefit from the access to additional rail carriers provided by this proposed project.

Table A-3 contains the aggregated employment in freight dependent sectors in each of the counties under study along with the index values for the freight related employment component.

Table A-3 Freight Related Employment Component Data and Index Values

Location	Total Employment in Freight Dependent Sectors	Index Value
Hancock County	6,050	1.02
Harrison County	29,500	4.96
Pearl River County	6,300	1.06
Three County Average	13,950	2.35
Mississippi	487,240	NA
Mississippi County Average	5,942	1.00

Source: Woods and Poole 2013 CEDDS Data, Values from 2011

The data in Table A-3 shows that Hancock County and Pearl River County are relatively average counties in terms of their freight dependent employment, while Harrison County has approximately five times the number of these jobs as an average county.

The rail freight movement component and the freight related employment component were averaged to produce the base rail freight intensity index. Table A-4 contains the base rail freight intensity index values along with sensitivity text values weighting one of the two components at 2/3 versus 1/3 for the other component.

Table A-4 Rail Freight Intensity Index Results

Location	Base Index Value	Sensitivity Analysis Index Value with Rail Freight Movement Component Weighted at 2/3	Sensitivity Analysis Index Value with Freight Related Employment Component Weighted at 2/3
Hancock	1.10	1.13	1.07
Harrison	6.51	7.02	5.99
Pearl River	1.02	1.01	1.03
Three County Average	2.43	2.46	2.40

The total rail freight intensity index values indicate that Hancock and Pearl River counties are above average in terms of the importance of rail freight services. Harrison County, a much larger metropolitan county with a significantly larger population and number of businesses, is substantially above average. Although the proposed project would be located in Hancock and Pearl River County, the rail connection could provide access to Norfolk Southern Railroad to support and be of use to Harrison County businesses. An index based on the average values of all of the components for the three counties shows more than two times the rail freight dependency of an average county. The sensitivity analysis shows little variation in the results.

Economic Preparedness Index – Analysis and Results

The economic preparedness index combines sales tax, income tax and property value components. Table A-5 contains a summary of the sales tax data and index calculations.

Table A-5 Sales Tax Component Data and Results

Location	Fiscal Year 2012 Sales	Fiscal Year 2012 Sales Tax	Component Index Value
Hancock County	$561,301,465	$31,148,965	1.00
Harrison County	$3,814,209,041	$239,086,333	7.70
Pearl River County	$495,430,696	$31,026,558	1.00
3-County Average	$1,623,647,067	$100,420,619	3.24
Mississippi	$41,209,942,665	$2,545,271,996	NA
82-County Mississippi Average	$502,560,276	$31,039,902	1.00

Source: Mississippi Department of Revenue, Annual Report FY 2012

Table A-5 shows Hancock and Pearl River County are right at the state county average in sales tax collections while Harrison County's sales tax collections are seven times the average county's sales tax collections.

Table A-6 contains a summary of the income tax data and index component calculations.

Table A-6 Income Tax Component Data and Results

Location	Fiscal Year 2012 Net Taxable Income	Fiscal Year 2012 Gross Income Tax	Component Index Value
Hancock County	$382,179,490	$17,439,097	1.06
Harrison County	$2,052,008,709	$93,402,093	5.65
Pearl River County	$481,421,310	$21,805,087	1.32
3-County Average	$971,869,836	$44,215,426	2.68
Mississippi Counties	$29,775,061,617	$1,355,180,432	NA
82-County Mississippi Average	$363,110,508	$16,526,591	1.00

Source: Mississippi Department of Revenue, Annual Report FY 2012

Table A-6 shows that Hancock County and Pearl River County are slightly above average in income tax collections, while Harrison County is more than five times the average.

Table A-7 contains a summary of the property value component calculations and results. It shows that both Hancock and Pearl River counties are well above average in terms of property value base and Harrison County is more than six times the average in the state.

Table A-7 Property Value Component Value and Results

Location	Total Assessment Value	Component Index Value
Hancock County	$549,041,797	1.75
Harrison County	$2,006,691,249	6.40
Pearl River County	$371,178,713	1.18
3-County Average	$975,637,253	3.11
Mississippi Counties	$25,699,535,798	NA
82-County Mississippi Average	$313,408,973	1.00

Source: Mississippi Department of Revenue, Annual Report FY 2012

The sales tax, income tax, and property value components are averaged to produce the base economic preparedness index. Table A-8 contains the base economic preparedness index values along with sensitivity text values weighting one of the three components at 50 percent and the other two at 25 percent each.

Table A-8 Economic Preparedness Index Results

Location	Value	Sensitivity 1	Sensitivity 2	Sensitivity 3
Hancock County	1.27	1.20	1.22	1.39
Harrison County	6.59	6.86	6.35	6.54
Pearl River County	1.17	1.13	1.21	1.17
3-County Average	3.01	3.06	2.92	3.03
	1/3 Weight Each	Sales Tax at 50%	Income Tax at 50%	Property Values at 50%

The economic preparedness index results show that Hancock County and Pearl River County are well above average in terms of having sufficient economic base to take advantage of infrastructure investments such as the proposed rail improvements. Harrison County, an urban county, is more than six times the statewide average in terms of economic preparedness by this index. The proposed project would be located in Hancock and Pearl River County but would also benefit Harrison County businesses. An index based on the average values of all of the components for the three county region shows more than three times the rail freight dependency of an average county. The sensitivity analysis did not show much variation in the results, although Hancock County does substantially better when property values are more highly weighted.

Conclusion

This analysis provides a series of indices related to the concentrations of freight related activity and economic activity in the counties that would be supported by the Port Bienville railroad connector. The overall result suggest that Hancock, Pearl River, and Harrison counties are better prepared in the near term than average Mississippi counties to make good use of an investment such as the proposed rail connector.

The freight rail transportation intensity index analysis shows that Hancock County was above average in its concentration of rail freight related activities. Harrison County was well above the average while Pearl River County was about average. The regional average for the freight rail transportation intensity index indicates approximately 2.5 times the freight related activity in these counties compared to an average Mississippi county.

The economic preparedness index showed above average values for all three counties. Although the proposed project is located in Hancock County, Pearl River and Harrison Counties have available industrial sites that could benefit from being located in or near sites with dual Class 1 rail services. This indicates there is a strong level of economic activity, and businesses that generate taxable value and jobs can make use of this rail infrastructure investment to produce local, regional, and statewide benefits strengthen the business case for this rail line that will provide dual Class 1 rail service in this region.

Appendix B: Port Bienville Economic Impacts

Use of the Regional Economic Model, Inc. (REMI) offers another methodology for evaluating the potential economic impacts that could result from access to dual Class 1 rail services. Economic impacts associated with the development of a rail connection from the Port Bienville Industrial Park (PBIP) through the Stennis Space Center (SSC) to the Norfolk Southern (NS) line are based on detailed surveys, data collection, and use of the REMI economic impact model. This section of the report describes the approach, information, and models used, as well as base- and build-scenarios. Economic model inputs are developed for three main activities associated with the rail connection (e.g., rail construction, existing firm expansion, and new firm attraction). The resulting economic impacts are presented by the various dimensions, including: impact component, measure, geography, and year.

Approach and Overview

Economic impact estimates are based on how the proposed rail connection would affect existing firms and attract new firms. The following methodology section outlines how such changes are assessed by impact components and entered into the Regional Economic Model, Inc. (REMI) model. Review of industry surveys provided an essential understanding of the importance of rail transportation to the Study Region's industrial economy.[32] A brief discussion of the REMI model used to forecast economic impacts highlights the unique dynamic nature of the model which enables it to evaluate the economic implications of changes in industry production costs, output, employment, etc.

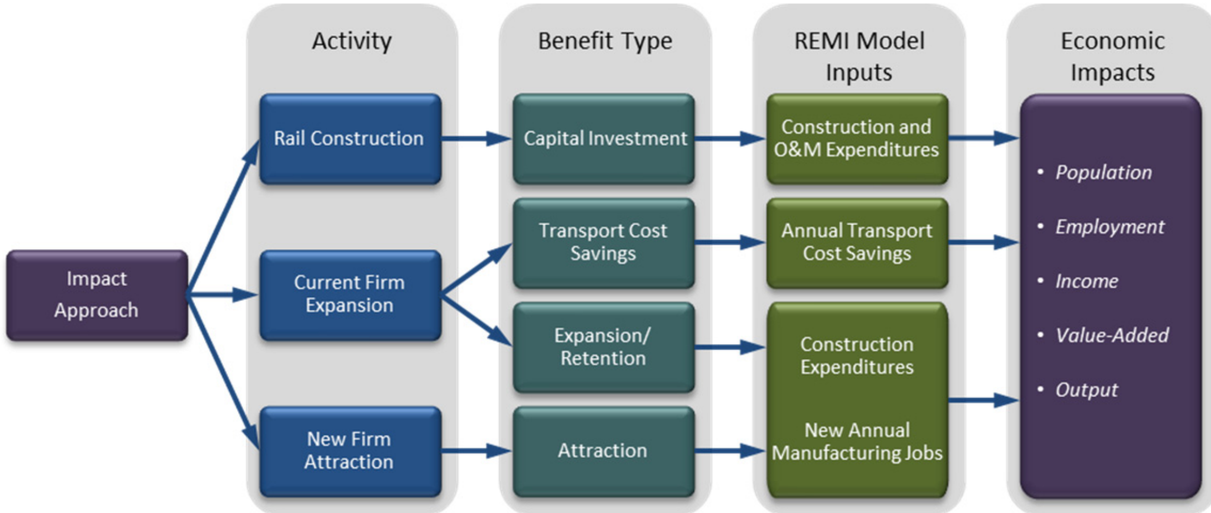
Methodology

Access to dual Class 1 railroad service by the Port Bienville Short Line Railroad should stimulate rail development, expansion of existing firms, and attraction of new firms. Such activities would affect various impact components including rail construction, rail transport costs, and new site development (both construction and ensuing tenant employment). This component analysis provides input into the REMI model used to estimate the resultant economic impacts associated with the rail development.

Conceptually, rail construction impacts include the capital investment of building and maintaining the new track. Current firm impacts include potential transport cost-savings as well as potential expansion. New firm impacts include site construction/development and on-site related employment. Combined, these various activities are appropriately entered into the REMI model to measure the resultant economic impacts over the 2014 to 2040 analysis period. Economic impacts are measured in terms of changes in population, employment, wages and salaries, value-added, and output, as compared to the regional control forecasts from REMI (i.e., the baseline conditions). Interrelationships between the various activities, impact components, REMI inputs, and resultant economic impact estimates are diagrammed in Figure B-1.

[32] For the purposes of this economic impact analysis, the Study Area is defined as Hancock and Pearl River counties.

Figure B-1 Impact Approach of Access to a Second Class 1 Railroad



Surveys and Other Data

Detailed surveys of local transportation and manufacturing firms, businesses, and government agencies in the Port Bienville area were performed and provide a foundational understanding of current freight rail dependence, use, and impacts. In general, the surveys indicate an overall satisfaction with the community, workforce, taxes, location, etc. Further, Study Area companies anticipate current business activity to continue and/or expand.

More specifically, the surveys helped assess how access to a second Class 1 rail service via the proposed extension of the Port Bienville Short Line Railroad to Nicholson would affect future business operations and industry attraction. Several of the firms indicated significant current rail use and dependence despite access to a single Class 1 carrier. Further, they anticipate notable decreases in rail transport costs, scheduled transit times, and unforeseen delays with a second Class 1 connection. The specifics of the rail business surveys were provided on pages 7-11. A few firms went on to specify scenarios in which future growth could well be enhanced through the proposed additional rail connection. Lastly, it was noted that the secondary rail access to the north would effectively mitigate future hurricane disasters, and hence would further improve the region's attractiveness to existing business expansion and/or new business attraction.

While most of the survey information was descriptive, some was quantitative and provided an order-of-magnitude basis for estimating site development and employment estimates for inputs into the REMI model. Such qualitative information was substantiated through a review of TRANSEARCH rail freight flow data for Hancock and Pearl River Counties, obtained from the previous Mississippi State Rail Plan[33]. Literature review was conducted regarding rail transport operating costs for both a captive and non-captive industrial environment and can be found on pages 6 and 7 in the report.

[33] Mississippi State Rail Plan, 2011; Wilbur Smith Associates

Impact Terminology

Economic impacts pertain to three activities (rail development, existing firm expansion, and new firm attraction) include two *types*: *direct* and *multiplier*; comprise four components (rail construction, rail transport cost savings, site development, and site employment); are measured via five variables (*population*, *jobs*, *wage and salaries*, *value-added*, and *output)*; and, are evaluated by region. These impact types, components, measures, and regions are defined below.

Impact Types

The three activity impacts consist of two types (and a combined total):

- *Direct* – Impacts associated directly with rail capital investment expenditures, transport cost-savings, and/or other firm expansion/attraction. For example, the direct impacts from rail construction pertain to the labor and capital employed in the development of the rail line and are attributed only to the construction industry;
- *Multiplier* – Comprises both indirect and induced impacts. Indirect impacts are associated with the suppliers that provide intermediate goods and services to the *directly* impacted industries; and, induced impacts reflect the re-spending of earned income (from the directly and indirectly impacted industries in a given impact region); and
- *Total* – Aggregated *direct*, *indirect*, and *induced* components; only these total aggregative impacts are generated by the REMI model and presented in the results section.

Impact Components

Four impact components pertain to the second rail line development:

- *Rail Construction* – Rail construction and additional operation and maintenance expenditures;
- *Rail Transport Cost Savings* – Operating cost savings to existing rail users (primarily Study Area outbound shipments of finished products and materials) from access to a second Class 1 rail carrier;
- *Site Development* – New facility construction resulting from access to a second Class 1 rail carrier. Includes both existing firm expansion and new firm attraction; and
- *Site Employment* – Increased Study Area employment resulting from existing firm expansion and new firm attraction.

Impact Measures

Impacts are measured by five economic metrics:

- *Population* – Resident population attracted;
- *Jobs/Employment* – Employment measured in terms of full-time-equivalent (FTE) job-years;
- *Wages and Salaries* – Wage/salary earnings paid to the associated jobs;
- *Value-Added* – Net additional economic activity (i.e., total output less gross intermediate inputs), synonymous with GRP (gross regional product) or GSP (Gross State Product)
- *Output* – Total production value associated with all levels of economic activity (comprised of gross intermediate inputs and value added, combined).

Impact Regions

The two primary geographic regions evaluated include the Study Area and the State.

- *Study Area* – Both Hancock and Pearl River Counties, separately and combined; and
- *Mississippi* – Study Area impacts are compared to the entire State.

Due to data availability and economic model results, only total impacts are presented in the Economic Impacts Results section beginning on page 52. Of the measures, employment is evaluated in depth since it is the most widely understood measure by the broadest audience. Geographically, emphasis is placed on presentation of Hancock County, due to its central location relative to the rail line development (i.e., Port Bienville Industrial Park and Stennis Space Center).

REMI Model Outline

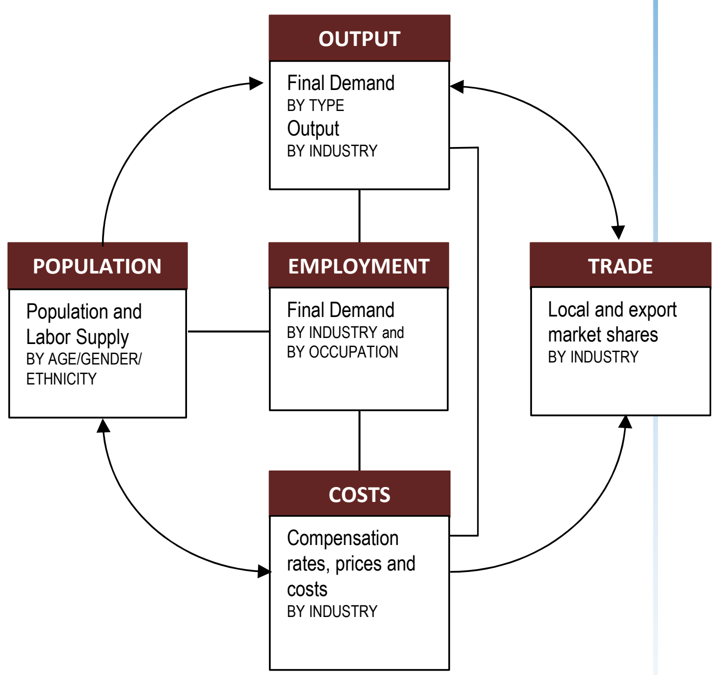
The proposed rail connection would lower rail transport costs for existing users and attract additional business to the Study Area. The REMI model[34] is used to forecast the impacts associated with rail development, user-cost savings, site development, and new site employment.

REMI Overview

The REMI model is a dynamic forecasting tool that combines input-output econometric modeling with economic geography. It models the economic impacts of industry and/or policy changes by identifying the interrelationships and ensuing impacts in five major block sectors of the economy, through simultaneous equations reflecting the dynamic feedback effects of each sector on each other. The five-sector inter-linkages of the REMI model are shown in Figure B-2.

REMI enables users to defensibly evaluate the effect of cost-input changes, which non-dynamic (static Input-Output) models cannot address. Moreover, REMI is not traditionally used to evaluate impacts associated with current industry. Rather, it evaluates future changes, and measures how an economy reacts. Specifically, it measures how multiple regions (two or more) respond to changes over time (e.g., years). Substitution effects play a major driver in the multiple-region model. Such effects, for example, include how displaced workers with certain skill sets migrate to other regions, or how they transfer from one industry to another (often at lower pay levels).

Figure B-2 REMI Model Sector Linkages

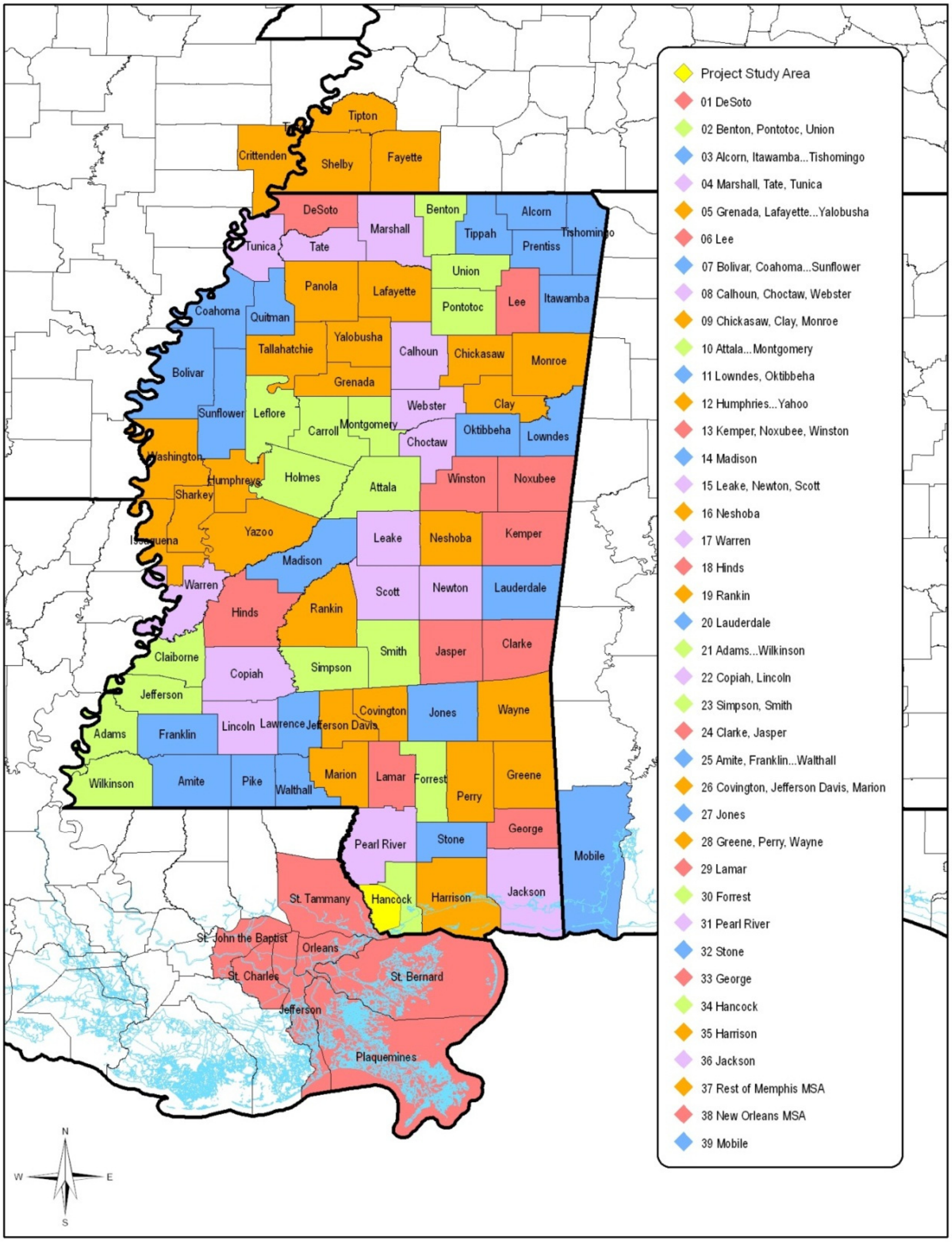


REMI Regions

[34] REMI TranSight v3.3

39 regions are available in the Mississippi REMI model including metropolitan areas (New Orleans, Memphis, and Mobile) of three surrounding states as shown in Figure B-3. The primary Study Area evaluated in this impact analysis include Hancock and Pearl River Counties (which are stand-alone regions in the model), as well as the overall State.

Figure B-3 REMI Regions in Mississippi



Scenarios

An economic impact evaluation must compare at least two scenarios: a reference base case (no-build) with an improvement (build) scenario. Since the various considered alignment alternatives for the rail development have no discernible difference from an economic perspective (given the investment cost, length, connectivity effect, etc. would be relatively the same), a single improvement scenario is evaluated and compared to the baseline no-build scenario.

Base Case

In the baseline no-build scenario, socioeconomic characteristics over the next 30 years are extracted from the control forecast in REMI, which provides anticipated population, employment, and other socioeconomic variable changes from 1990 through 2040, with a highlight on years 2012 and 2040. Regarding the economy, employment, wages and salaries, value-added, and output are detailed by industry for both Hancock and Pearl River Counties. Such base case socioeconomic variables are outlined below and provide a basis by which to compare potential development impacts in the ensuing sections.

Socioeconomic Summary

Hancock and Pearl River County Study Area population currently totals 102,565, or about 3.4% of the State population. By 2040, population is forecast as 118,779, an increase of 15.8%. Employment is forecasted to grow at a more rapid pace of 31.1% over the same period, from 42,846 to 56,179. Associated wages and salaries are forecasted to grow 82.5% from $1.21 billion to $2.20 billion (in 2012$). Value-added and output for the Study Area and Mississippi are summarized in Table B-1 for 2012 and 2040.

Table B-1 Baseline Socioeconomic Summary (2012, 2040)

Measure by Year	Mississippi	Study Area			
		Hancock	Pearl River	Subtotal	% of MS
Year 2012					
Population	2,986,443	**42,991**	59,574	102,565	*3.4%*
Employment	1,500,881	**23,951**	18,895	42,846	*2.9%*
Wages and Salaries*	$44,272.1	**$798.9**	$406.7	$1,205.6	*2.7%*
Value Added*	$104,397.5	**$1,651.5**	$947.4	$2,598.9	*2.5%*
Output*	$195,564.3	**$2,986.0**	$1,784.8	$4,770.8	*2.4%*
Year 2040					
Population	3,299,867	**52,369**	66,410	118,779	*3.6%*
Employment	1,944,190	**30,152**	26,028	56,179	*2.9%*
Wages and Salaries*	$85,037.3	**$1,335.0**	$865.5	$2,200.5	*2.6%*
Value Added*	$192,828.8	**$2,906.8**	$1,878.0	$4,784.8	*2.5%*
Output*	$340,475.5	**$5,051.4**	$3,313.6	$8,364.9	*2.5%*
Growth (2012 to 2040)					
Population	10.5%	**21.8%**	11.5%	15.8%	*na*
Employment	29.5%	**25.9%**	37.8%	31.1%	*na*
Wages and Salaries	92.1%	**67.1%**	112.8%	82.5%	*na*
Value Added	84.7%	**76.0%**	98.2%	84.1%	*na*
Output	74.1%	**69.2%**	85.7%	75.3%	*na*

Source: REMI; * in millions of fixed 2012 dollars

Sector Employment

Total Study Area employment is forecast to grow from 42,846 jobs in 2012 to 56,179 jobs by 2040. Shown by sector in Table B-2, manufacturing employment is forecast to decline nearly 20% from 2,267 to 1,820 jobs. Conversely, transportation/warehousing employment is forecasted to grow 30% over the same future horizon from 975 to 1,265 jobs. Past historical and future forecasts by sector are charted in Table B-2; note that the manufacturing and transportation/warehousing trend lines are marked.

Table B-2 Baseline Employment by Sector (2012, 2040)

Sector	Year 2012			Year 2040		
	Hancock	Pearl River	Total	Hancock	Pearl River	Total
Forestry and Fishing	197	162	359	241	209	450
Utilities	174	89	263	103	89	192
Construction	2,466	2,503	4,968	4,053	4,785	8,838
Manufacturing	1,415	852	2,267	1,108	712	1,820
Wholesale Trade	190	289	478	180	293	473
Retail Trade	2,102	2,645	4,747	2,244	2,899	5,143
Transport and Warehousing	465	510	975	635	630	1,265
Information	110	170	280	97	159	257
Finance and Insurance	711	626	1,337	896	739	1,635
Real Est., Rental, Leasing	1,301	706	2,007	1,775	896	2,671
Professional and Tech. Srvs.	2,321	647	2,968	3,348	1,262	4,609
Mgmt. of Companies	29	39	67	30	40	70
Admin. and Waste Srvs.	2,054	973	3,027	2,332	983	3,316
Educational Services	246	95	341	344	131	476
Health Care & Social Assist.	1,073	1,245	2,319	1,904	2,518	4,422
Arts, Enter. and Recr.	1,058	212	1,270	1,474	291	1,765
Accomm. & Food Srvs.	1,868	1,201	3,070	2,485	1,551	4,035
Other Srvs., exc. Public Adm.	1,228	1,486	2,714	1,676	2,199	3,875
State and Local Gov't	1,923	3,074	4,997	2,629	4,546	7,176
Federal Civilian	1,930	144	2,074	1,746	131	1,876
Federal Military	743	351	1,094	625	295	920
Farm	252	801	1,053	179	570	750
Total	23,951	18,895	42,846	30,152	26,028	56,179

Source: REMI

Manufacturing Employment

Over 80% of current Hancock County manufacturing employment is in Chemicals (328 jobs) or Other Transportation Equipment (810 jobs), combined. Including Pearl River, a total of 1,424 people are currently employed in the Chemical and Other Transportation Equipment industries. By 2040, such Chemical and Other Transportation Equipment industry employment is forecasted to decline 16% to 1,197. Year 2012 and 2040 manufacturing industry employment is shown in Table B-3. Historical and forecast data by manufacturing sub-sector are charted in Figure B-5; note that both the chemical and other transportation equipment trendlines are marked.

Manufacturing Productivity Trends

The manufacturing employment decline over the 2012 to 2040 time period does not imply a corresponding decline in Hancock County manufacturing production. Rather, it reflects regional productivity gains resulting from automation efficiency increases. Simply, more is produced with fewer employees, as illustrated in Figure B-6, which shows the chemical and transportation equipment manufacturing output increasing through 2040.

Transportation Employment

While Study Area trucking employment is forecasted to grow 23% from 614 to 753 employees, rail employment is not expected to change. Comparatively, warehousing/storage employment is forecasted to grow 47% from 57 to 84 jobs, as shown in Table B-4.

Table B-3 Baseline Manufacturing Employment Detail (2012, 2040)

Sector	Year 2012			Year 2040		
	Hancock	Pearl River	Total	Hancock	Pearl River	Total
Apparel	0	47	47	0	38	38
Beverage and Tobacco	8	12	21	11	16	26
Chemical	328	105	433	212	101	313
Computer and Electronics	7	0	7	4	0	4
Electrical and Appliance	63	0	63	34	0	34
Fabricated Metal Product	62	98	159	63	100	163
Food	0	43	43	0	43	43
Furniture and Related	5	10	15	2	4	6
Leather and Allied	0	0	0	0	0	0
Machinery	28	115	143	20	85	105
Miscellaneous	18	4	23	19	4	23
Motor Vehicles, etc.	47	12	59	32	5	37
Nonmetallic Mineral	4	2	7	6	3	9
Other Transportation Equip.	810	181	991	684	200	884
Paper	0	108	108	0	48	48
Petroleum and Coal	0	17	17	0	11	11
Plastics and Rubber	7	23	30	5	12	17
Primary Metal	20	0	20	10	0	10
Printing And Related	8	61	69	5	34	38
Textile Mills	0	0	0	0	0	0
Textile Product Mills	0	12	12	0	11	11
Wood Product	0	1	1	0	1	1
Total	1,415	852	2,267	1,108	712	1,820

Source: REMI

Table B-4 Baseline Transportation Employment Detail (2012, 2040)

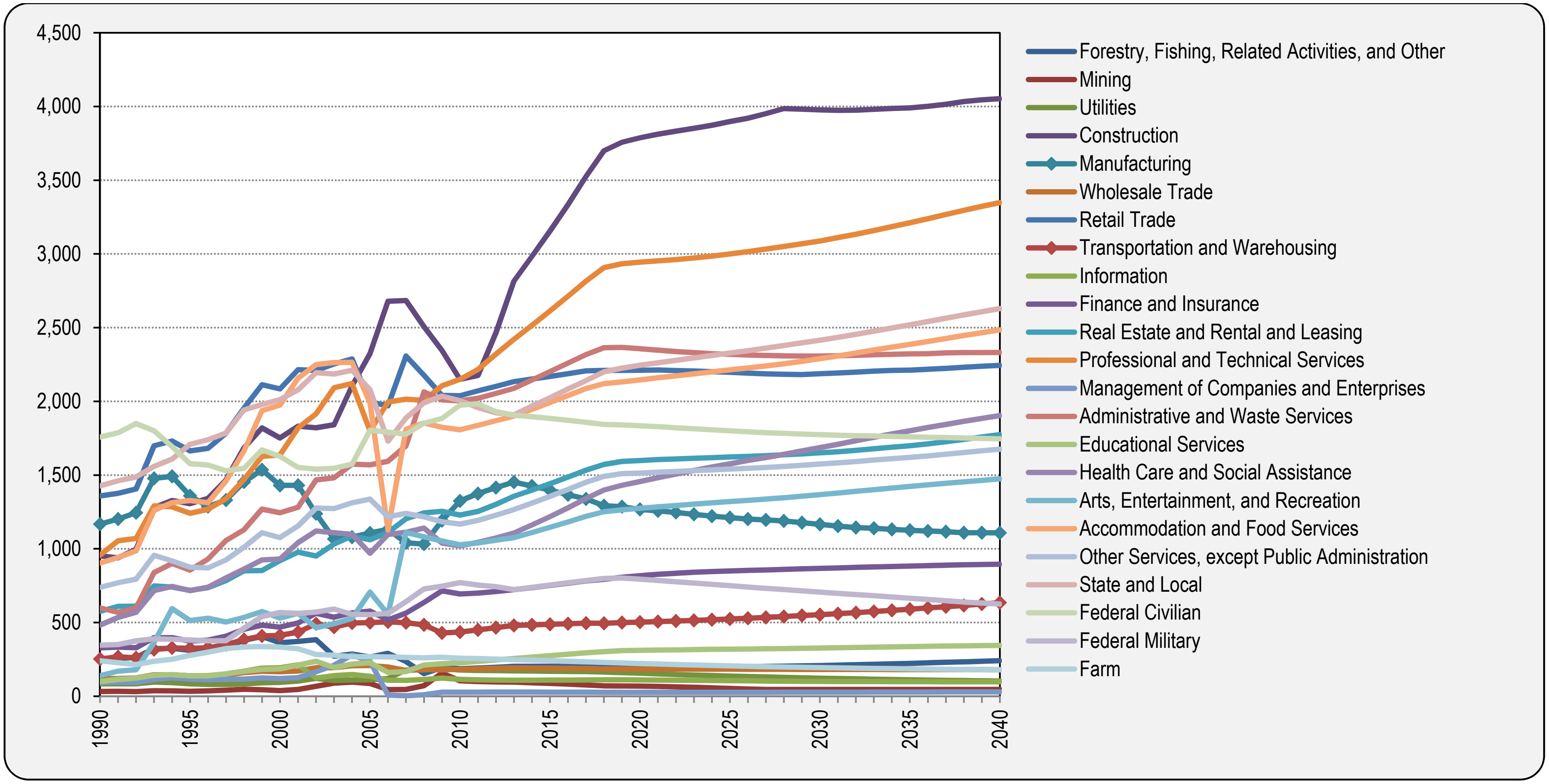
Sector	Year 2012			Year 2040		
	Hancock	Pearl River	Total	Hancock	Pearl River	Total
Air	0	0	0	0	0	0
Pipeline	2	11	13	1	7	9
Rail	33	43	75	33	42	75
Scenic And Sightseeing	121	49	170	203	79	282
Transit And Ground Passenger	2	26	28	3	39	42
Truck	234	380	614	291	462	753
Warehousing And Storage	57	0	57	84	0	84
Water	17	0	17	20	0	20
Total	465	510	975	635	630	1,265

Source: REMI

Base-Case Socioeconomic Conclusion

Under the no-build base case, the Hancock-Pearl River Study Area economy is forecasted to grow over the 29-year analysis period (2012 to 2040). Population is forecast to grow 15.8% and total employment 31.1%. However, employment growth is not uniform over the various industries. In manufacturing, productivity gains from automation efficiency increases are forecast to result in lower employment despite increased output (see Figure B-6). This is especially evident in the two leading manufacturing sub-sectors: chemicals and transportation equipment. This manufacturing productivity trend in Hancock, Pearl River, and Mississippi, reflects national trends over the preceding decades that will continue.

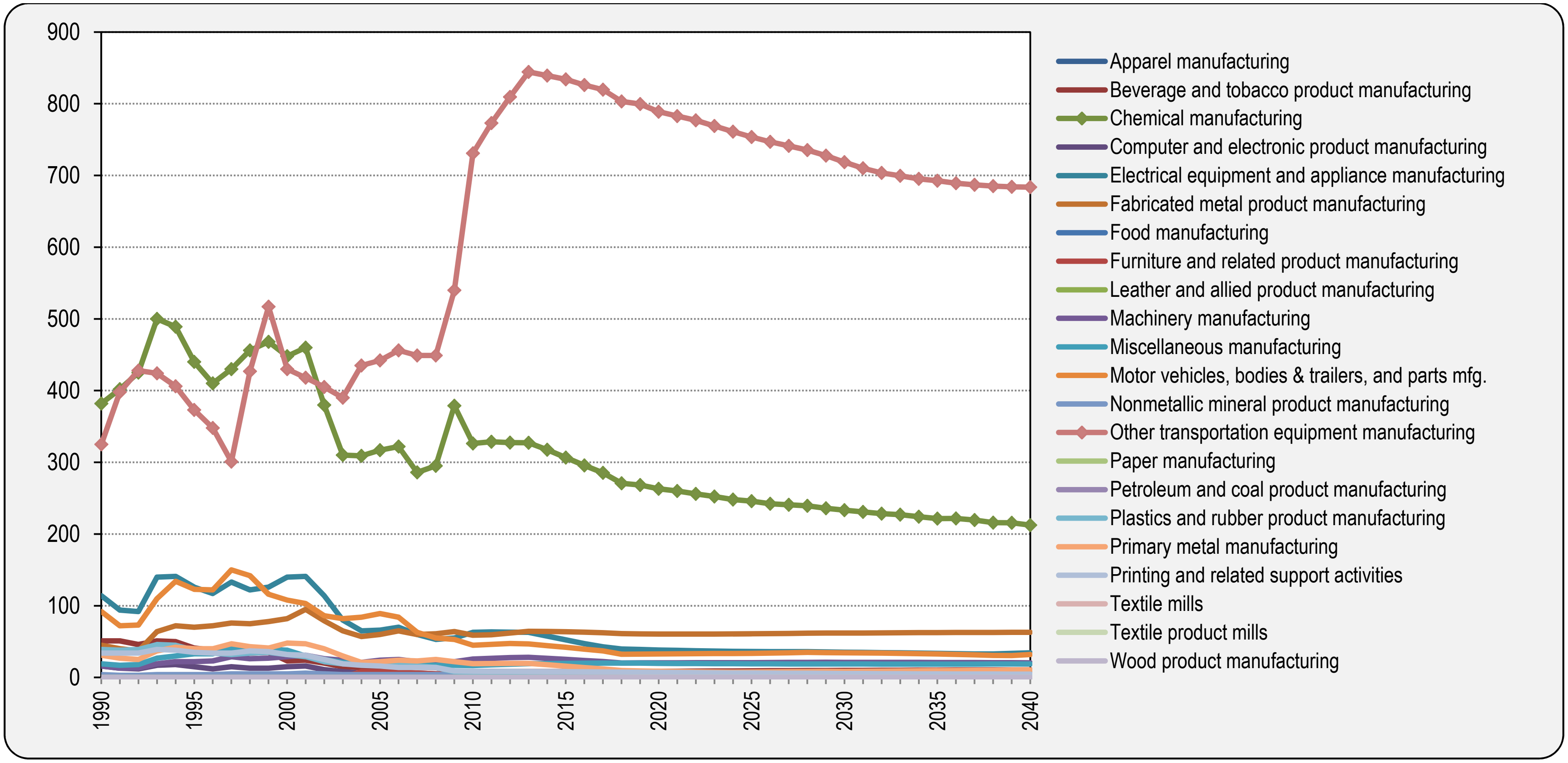
Figure B-4 Total Employment – Historical and Baseline Forecast (Hancock County)



Source: REMI

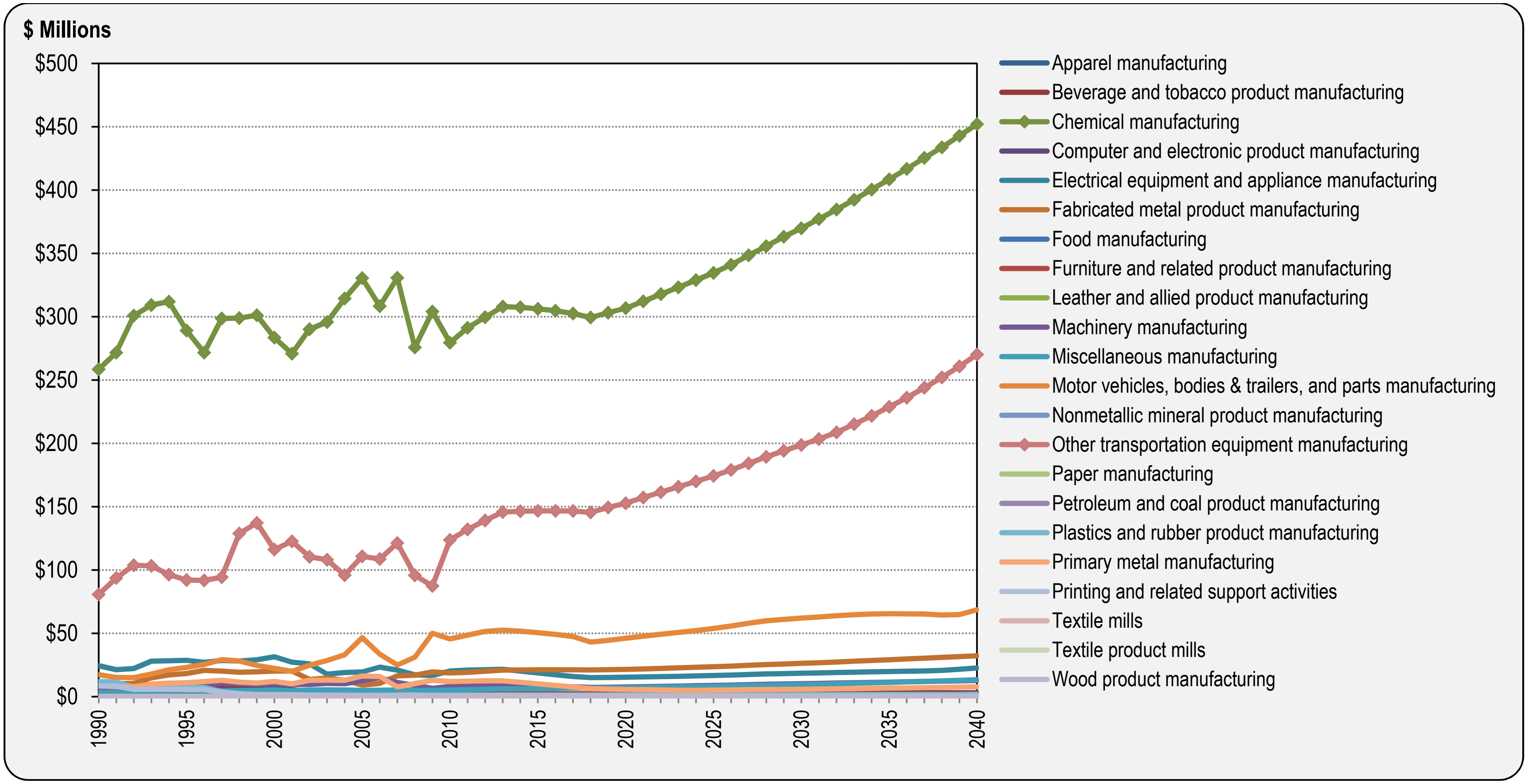
Note: Hurricane Katrina occurred in 2005

Figure B-5 Manufacturing Employment – Historical and Baseline Forecast (Hancock County)



Source: REMI

Figure B-6 Manufacturing Output – Historical and Baseline Forecast (Hancock County)



Source: REMI

Build Case

The proposed rail connection from Port Bienville to the NS line would span approximately 24 miles, and would traverse the Stennis Space Center buffer area. The estimated construction cost to plan and construct the rail connection is $90.0 million. These along with other operation and maintenance costs (approximately $11.0 million over twenty years) are summarized by year and costs component below. Such construction and operation of the rail connection would generate construction-related direct and multiplier impacts, as presented in the Economic Impacts Results section beginning on page 52.

REMI Model Inputs

Various activities associated with the rail improvement are estimated by impact component and entered into the REMI model to derive dynamic economic impact results by year, measure, and geographic region (this overall process was diagrammed previously in Figure B-1). Rail construction impacts and site development impacts reflect the short-term capital infrastructure effect associated with implementing the project. Comparatively, the transport costs saving impacts and the site employment impacts represent the long-term annual effect on economic activity. The following discussion explains the nature and magnitude of the various REMI inputs.

Rail Construction and Operation Costs

Development and operations of the proposed rail line would generate economic impacts over the 27-year period (through 2040, the horizon analyzed), stemming from the $101.0 million in total costs, which include $90.0 in initial development and $11.0 million in ongoing operation and maintenance. Annual costs are shown by type in Table B-5, and discussed below.

Infrastructure Development

Rail development costs are estimated at $90.0 million over six years, with $6.6 million in planning and engineering (P&E) costs, comprising 7.1% of total development costs, spanning the first three years (2014 through 2016). In addition, $1.4 million in right of way (ROW) costs (1.5%) occur in years 2016 and 2017. Construction is assumed to begin in year 2017 and span slightly more than two years totaling $82.0 million (91.1% of total costs).

As right-of-way expenditures largely comprise property transfers (as opposed to value-added/productive economic activities) and the P&E would likely be conducted outside of the Study Area, only the construction expenditures occur on-site and are applicable for the REMI model.

Annual Operations

Annual operation costs are estimated to start at $293,400 in year 2020, rising gradually over twenty years to $800,800 by year 2040.

Table B-5 Capital Infrastructure Investment Costs (in 2012 $)

Year	Development				Operation & Maintenance	Annual Total
	ROW	Planning & Engineering	Construction	Total		
2014	$0	$1,000,000	$0	$1,000,000	$0	$1,000,000
2015	$0	$3,600,000	$0	$3,600,000	$0	$3,600,000
2016	$400,000	$2,000,000	$0	$2,400,000	$0	$2,400,000
2017	$1,000,000	$0	$5,000,000	$6,000,000	$0	$6,000,000
2018	$0	$0	$40,000,000	$40,000,000	$0	$40,000,000
2019	$0	$0	$37,000,000	$37,000,000	$0	$37,000,000
2020	$0	$0	$0	$0	$293,400	$293,400
2021	$0	$0	$0	$0	$302,200	$302,200
2022	$0	$0	$0	$0	$311,300	$311,300
2023	$0	$0	$0	$0	$320,600	$320,600
2024	$0	$0	$0	$0	$330,200	$330,200
2025	$0	$0	$0	$0	$340,100	$340,100
2026	$0	$0	$0	$0	$350,300	$350,300
2027	$0	$0	$0	$0	$360,800	$360,800
2028	$0	$0	$0	$0	$371,700	$371,700
2029	$0	$0	$0	$0	$382,800	$382,800
2030	$0	$0	$0	$0	$595,900	$595,900
2031	$0	$0	$0	$0	$613,800	$613,800
2032	$0	$0	$0	$0	$632,200	$632,200
2033	$0	$0	$0	$0	$651,200	$651,200
2034	$0	$0	$0	$0	$670,700	$670,700
2035	$0	$0	$0	$0	$690,800	$690,800
2036	$0	$0	$0	$0	$711,500	$711,500
2037	$0	$0	$0	$0	$732,900	$732,900
2038	$0	$0	$0	$0	$754,900	$754,900
2039	$0	$0	$0	$0	$777,500	$777,500
2040	$0	$0	$0	$0	$800,800	$800,800
Total	$1,400,000	$6,600,000	$82,000,000	$90,000,000	$10,995,600	$100,995,600

Source: CDM Smith / HDR Inc.

Transport Cost-Savings

While each circumstance varies, literature review indicates that typical prices for single Class 1 rail service are nearly twice that of a competitive environment (e.g. two or more Class 1 carriers). Nonetheless, even monopolistic Class 1 rail service is less expensive than trucking per-mile and much more practical for low-value-to-weight cargoes, and non-time-sensitive movements. However, such monopolistic rail pricing deters further industry investment. This issue was raised several times in surveys with local business leaders in and around Port Bienville.

Literature Review

To understand how rail rates vary between captive versus non-captive rail carrier services, various sources were researched, including the Surface Transportation Board (STB),[35] the General Accounting Office (GAO), [36] and Consumers United for Rail Equity (CURE).[37] These and other informed sources detail the various issues associated with the Railroad Revitalization Act (1976), the Staggers Rail Act (1980), and revenue (pricing) per rail variable costs, etc.

Overall, a general concern remains about competition given captive (e.g., monopolistic) markets and fewer railroads. Since 2006, Consumers United for Rail Equity documents suggest that further railroad consolidation and other related factors have led to higher return margins for railroads and monopolistic pricing. A number of studies analyzing the economic impacts and benefits of non-captive rail markets versus captive rail market have found that on-captive industrial facilities (those facilities with access to more than once rail provider) realize between 30 to 45 percent lower rail rate than those paid by captive rail markets.

Local Rail User Perspective

Such findings support the assertions of the surveyed firms. Specifically, two firms independently noted their relative competitive disadvantage to other companies served by two Class 1 carriers. Such examples reflect typical costs and schedules and do not address the additional costs and penalties borne by shippers due to congested transit through the congested Gentilly Yard in New Orleans or other delays. Several firms also stressed that such cost penalties would be alleviated, at least partially, with second Class 1 rail access.

Impact Modeling Assumptions

As such, for REMI modeling, the 45% transport cost savings were applied to the relative local demand for rail services, and a weighted transportation cost savings percent (product of the 45% rail price reduction and the percentage of local rail demand) was applied to the Hancock and Pearl River counties. This savings was input into the REMI TranSight transportation cost savings matrix between origin and destination regions within the model for specified years. It is assumed that the savings will occur in each and every year following the completion of the rail development (i.e., post-2019). Total impact results of such REMI model inputs are summarized in the section beginning on page 52. It is noted that the direct effect of such cost-savings would generate an estimated 300 manufacturing jobs by the year 2025. Such jobs could arise from existing firm expansion and/or new firm attraction.[38]

---

[35] "An Update to the Study of Competition in the U.S. Freight Railroad Industry," The Surface Transportation Board; January, 2010

[36] "FREIGHT RAILROADS - Industry Health Has Improved, but Concerns about Competition and Capacity Should Be Addressed," GAO-07-94; October 2006

[37] "How Do Captive Rail Rates Compare to Competitive Rail Rates?" Consumers United for Rail Equity; November, 2005

[38] As addressed in Section 0, total impacts comprise direct and multiplier types.

Table B-6 Revenue per Ton - Captive vs. Competitive Markets

	NS	CSX	BN	UP
Farm Products				
Captive	$21.37	$36.74	$45.28	$37.99
Competitive	$11.88	$20.83	$26.09	$21.29
Savings	*44%*	*43%*	*42%*	*44%*
Coal				
Captive	$17.56	$17.22	$16.77	$17.00
Competitive	$9.76	$9.76	$9.66	$9.53
Savings	*44%*	*43%*	*42%*	*44%*
Chemicals				
Captive	$36.98	$34.33	$42.57	$38.94
Competitive	$20.56	$19.46	$24.52	$21.82
Savings	*44%*	*43%*	*42%*	*44%*
Lumber or Wood				
Captive	$29.43	$36.13	$59.19	$59.49
Competitive	$16.36	$20.48	$34.10	$33.34
Savings	*44%*	*43%*	*42%*	*44%*
Pulp, Paper				
Captive	$39.48	$40.82	$62.14	$55.40
Competitive	$21.95	$23.14	$35.80	$31.05
Savings	*44%*	*43%*	*42%*	*44%*

Source: Escalation Consultants, for Consumers United for Rail Equity

Site Construction and Employment

Site development associated with transportation infrastructure investment is difficult to estimate given that such transportation investment is one of many factors that attract new industry and/or induce existing industry to expand. Other factors contributing a significant role in such decisions include the overall economies (local, national, and even international), employment levels (and unemployment rates), education levels, labor force skills, tax structure and rates, quality of life, etc. While many such factors can be quantified, many are evaluated qualitatively. All such decisions are multifaceted and situational, and are conducted with interrelated considerations. For such reasons, it is difficult to accurately estimate the bottom-line development effect of the infrastructure investment, net of Study Area transfers that would occur regardless of any isolated transportation improvement.

With this in mind, the various surveys conducted with existing area industry, freight transport providers, and local government officials were reviewed. Additionally, an inventory of developable acreage was conducted to: generate a current baseline comparison of manufacturing employment and acreage; and, to provide an order-of-magnitude development ceiling. Ultimately, this information and perspective was used to estimate the resultant direct on-site employment associated with the rail line infrastructure investment. Such site employment estimates are over-and-above the related manufacturing job estimates associated with the transport cost savings addressed previously.

Surveys

General sentiments among the major Port Bienville Industrial Park tenants anticipate some growth at the park, regardless of whether or not the secondary rail connection occurs. However, much discussion pointedly identified the high cost and reliability issues associated with a single

Class 1 carrier. Distillation of the surveys suggests that *the secondary Class 1 carrier access would make the location significantly more competitive for industrial development and would lead to further growth above expected baseline growth*.

Specifically, surveys indicate that such growth would first entail hiring of additional employees to work existing shifts. Secondly, additional shifts would be added to expand output of existing facilities. Thirdly, existing undeveloped land (either owned privately or by the Hancock County Port and Harbor Commission) would be developed. However, limited definitive statements were made stating specific growth that would occur with the rail expansion.[39]

Site Acreage

A total of 13,803 acres were identified in the Hancock-Pearl River Study Area. Of this acreage, 164 acres in the Port Bienville Industrial Park were identified as non-developable. Of the remaining total 13,639 acres, 4,994 acres are already developed, leaving 8,645 (63%) as available for further development. The following discussion summarizes acreage by location.

- *Port Bienville Industrial Park* – There are 3494 developable PBIP acres, 1,210 are owned by existing tenants to facilitate future expansion, the remaining 1,785 acres are held by the Hancock County Port and Harbor Commission (HCDC). 439 (13%) have been developed to-date. HCDC data suggests that these 439 developed acres are home to 18 firms and support 1,200 jobs, yielding a job per acre ratio of 2.73.

- *Stennis Space Center (Fee Area)* – There is a total of 13,800 acres within the fence at the Stennis Space Center and 125,000 acres that provide an acoustical buffer area around the facility. There are 8,000 acres that are currently undeveloped in the fee area of the SCC, 4,400 (55%) have been developed and 3,600 acres (45%) are available for lease. This does not include any other acreage in the buffer area outside of the currently designated fee area.

- *Other* – Of the 2,205 remaining acres identified in the other industrial areas in Hancock or Pearl River counties, the airport industrial park accounts is 155 acres.[40] Available data suggests that 2,050 acres are available for further industry development. Of this, 1,500 acres in Hancock County currently comprise a tree-farm across the street from the PBIP slated for potential development when needed.[41]

---

[39] Such reluctance or inability to accurately divulge speculative development prospects without a specific business plan envisioning probable situations is the nature of business surveys. This is especially true when the private sector interviewee speculates business growth based on public transportation system infrastructure investment.

[40] No data was available for the *Other Developed Acres* in Hancock and Pearl River Counties. However, such acreage is not considered significant.

[41] Note that currently, 197 Hancock County jobs are in the Forestry and Fishing sector. Information was not obtained regarding the share that is forestry or how many forestry jobs are linked to this tract of 1,500 acres.

Table B-7 Study Area Developable Acres

Site	Developable					Non-Developable[1]	Total
	Developed	Undeveloped			Subtotal		
		Held or For Lease	For Sale	Subtotal			
PB Industrial Park							
HCDC	25	1,165	620	1,785	1,810	164	1,974
Tenants	414	1,154	56	1,210	1,624	na	1,624
Subtotal	439	2,319	676	2,995	3,434	164	3,598
Stennis Space Center (Fee Area)	4,400	3,600	--	3,600	8,000	--	8,000
Other							
Airport	155	--	45	45	200	--	200
Hancock Co.	na	--	1,500	1,500	1,500	--	1,500
Pearl River Co.	na	--	505	505	505	--	505
Subtotal	155	--	2,050	2,050	2,205	--	2,205
Total	**4,994**	**5,919**	**2,726**	**8,645**	**13,639**	**164**	**13,803**

Source: HCDC, Stennis, MDA, and CDM Smith discussions with local business leaders
[1]Includes roadway, rail right-of-way, and unusable marsh land

Site Development Ceiling

Applying the existing 2.73 job per acre ratio to the identified 8,645 undeveloped acres suggests a ceiling of approximately 23,600 jobs. Such a full build-out scenario would be extremely unlikely even under the rail-extension scenario and a robust economy. Additional development would depend on many factors, of which the rail connection would be a single, albeit notable, component. Nonetheless, the key point is that the Study Area has sufficient land to accommodate developmental demand and does not appear physically constrained from expansion.

While it is unlikely that the hypothetical job ceiling of 23,600 will occur simply because the rail connection is built, the rail construction will shift the probability of increased job creation and the associated income, output, and other impacts.

Site Employment Impacts

Existing firm expansion and/or new firm attraction would result in additional direct employment and associated economic activity in the Study Area. It is assumed that such development would follow a similar composition as the existing area businesses. Such development is often referred to as clustering. Specifically, such Study Area industries include chemical manufacturing, fabricated metal products, transport equipment manufacturing, and plastic/rubber product manufacturing. This general perspective was confirmed through the various business surveys.

Surveys and discussions with local firms and business leaders indicate several manufacturing firms are extremely interested in investing in the Study Area. It is estimated that such firms could employ an additional 430 people, perhaps more. This conservative employment estimate of manufacturing firm expansion and/or attraction is in addition to the impacts associated with transport cost-savings, which would include some manufacturing job expansion. Such potential jobs would be anticipated to arise within five years of the new rail connection and generate additional multiplier related impacts. These 350 direct jobs would arise between 2021 and 2024 and would continue throughout the study analysis period (e.g., year 2040).

Site Construction Impacts

In addition to the annual site employment impacts, site development impacts would arise as existing facilities expand and/or new facilities are constructed. Such impacts are assumed to occur in the years prior to the site employment impacts (e.g., 2020 to 2023). To estimate the development costs entered into the REMI model, various sources were considered. The Organization for International Investment (OFII) tracks total site construction expenditures and new site employment by state for manufacturing facilities. Such information for 2011 was evaluated for seven southern states ranging from Texas to South Carolina. The average site investment cost per site job ranged from a low of just under $230,000 in Arkansas and Alabama to a high of nearly $1.0 million in Texas. To ensure relative conservatism, a site-development cost of $200,000/employee was multiplied by 350 site employment jobs; this generated a direct site investment of $70.0 million that was entered into the REMI model.

Hurricane Mitigation Cost-Saving Impacts

Lastly, although no disaster mitigation impacts are estimated, the issue was raised and deserves airing given its inherent effect on the transport costs saving and site employment impacts previously addressed.

The CSX line from Mobile, Alabama past Port Bienville to the Gentilly Yard in Louisiana roughly parallels the Gulf Coast. Hurricanes Katrina and Isaac illustrate how storm damage can shut down rail movement along the coast. Discussions with various tenant and railroad operators indicate that the CSX line was down for approximately six months after Hurricane Katrina as derailed cars were collected and damaged rail lines repaired. Such closures inhibited freight transport through unshipped orders, higher transport cost via truck, and late delivery cost penalties. After Hurricane Isaac this line was back in operation in just over 30 days.

Access to a second rail line would provide an outlet for both rail cars and local shipments that would otherwise be in jeopardy. The potential benefits of a second Class 1 railroad access include cost savings and job retention impacts. While the Transport Cost-Savings section addressed typical cost savings, it does not address the cost-savings associated with unique, random events that could be avoided, or at least notably mitigated, via a direct northern access. Further, the surveys suggest that Hurricane Katrina played a major role in the closure of the IKEA facility, and may have deterred other existing firms from subsequent expansion.

In summary regarding hurricane mitigation, it is not easy to quantify the resultant economic impact. However, the additional rail access would affect transport costs from time to time, and would increase the relative attractiveness of the area to existing business expansion and/or new business attraction. No method was developed of how such disaster mitigation cost savings could be estimated and appropriately entered into the REMI model. Further, the relative magnitude of such impacts was considered of secondary importance to the transport cost savings and site employment impacts already addressed. Hence, to ensure conservative and defensible impact estimates, such disaster mitigation impacts were not specifically quantified.

Economic Impacts Results

Rail development and firm expansion/attraction activities would stimulate construction, transport cost-savings, and new site employment impact components. These effects were input into the REMI model to estimate the resultant annual impacts by impact measure and geography. The results were evaluated from different perspectives and compared with existing base economic data.

Impact Findings

The estimated impacts comprise many aspects including years, regions, impact component, industry sector, etc. Presenting all the impact measures by year for all the impact components and regions simultaneously would be excessive information to digest effectively. As such, the economic impacts are first presented in a disaggregated series of charts to illustrate how and where the Study Area job impacts arise and change over time and between regions. All the impact measures are then presented specifically for two benchmark years (2025 and 2040), providing a post-rail construction and site development business operation perspective. Lastly, the analysis hones-down direct manufacturing sector employment impacts. Resultant job impacts are presented by industry and compared to the overall base forecasted employment by year through 2040.

Annual Impacts

Combined effects of rail construction, transportation cost savings, and site development (construction and employment) result in varying job impacts over the analysis period, as diagrammed in Figure B-7). Initially, rail construction impacts would result in Study Area job impacts of 701 in 2018 and 680 in 2019. Initial opening year 2020 job impacts would surpass 1,000 (1,041) as a function of the increased competitiveness associated with the 45% decline in rail transport cost savings to existing firms, but is also contributed to by site construction-related activities. Such site development impacts are forecast to continue through 2023. Site employment would then arise subsequent to the new site development impacts; such impacts begin in year 2021 and continue through 2040.

Regional Impact Distribution

A notable majority of the impacts are anticipated to occur in Hancock County, as seen in Figure B-8. Over 90% of the job impacts during the rail construction period (years 2017 to 2019) are forecast to occur in Hancock county, 1% in Pearl River, and the other 6% elsewhere in Mississippi. After opening year 2020, the transport cost-savings impacts and the site development impacts result in a majority of impacts occurring in Hancock County. Nonetheless, a notable impact share occurs in Pearl River County. By 2024, the Hancock County impact share levels-off at 66%.[42]

Notably, the other Mississippi job impacts decline between 2020 and 2022 reflect economic restructuring due to the rail development, in which economic activity shifts into the Hancock and Pearl River counties from elsewhere in the State. Such a shift reflects the relative competitive

---

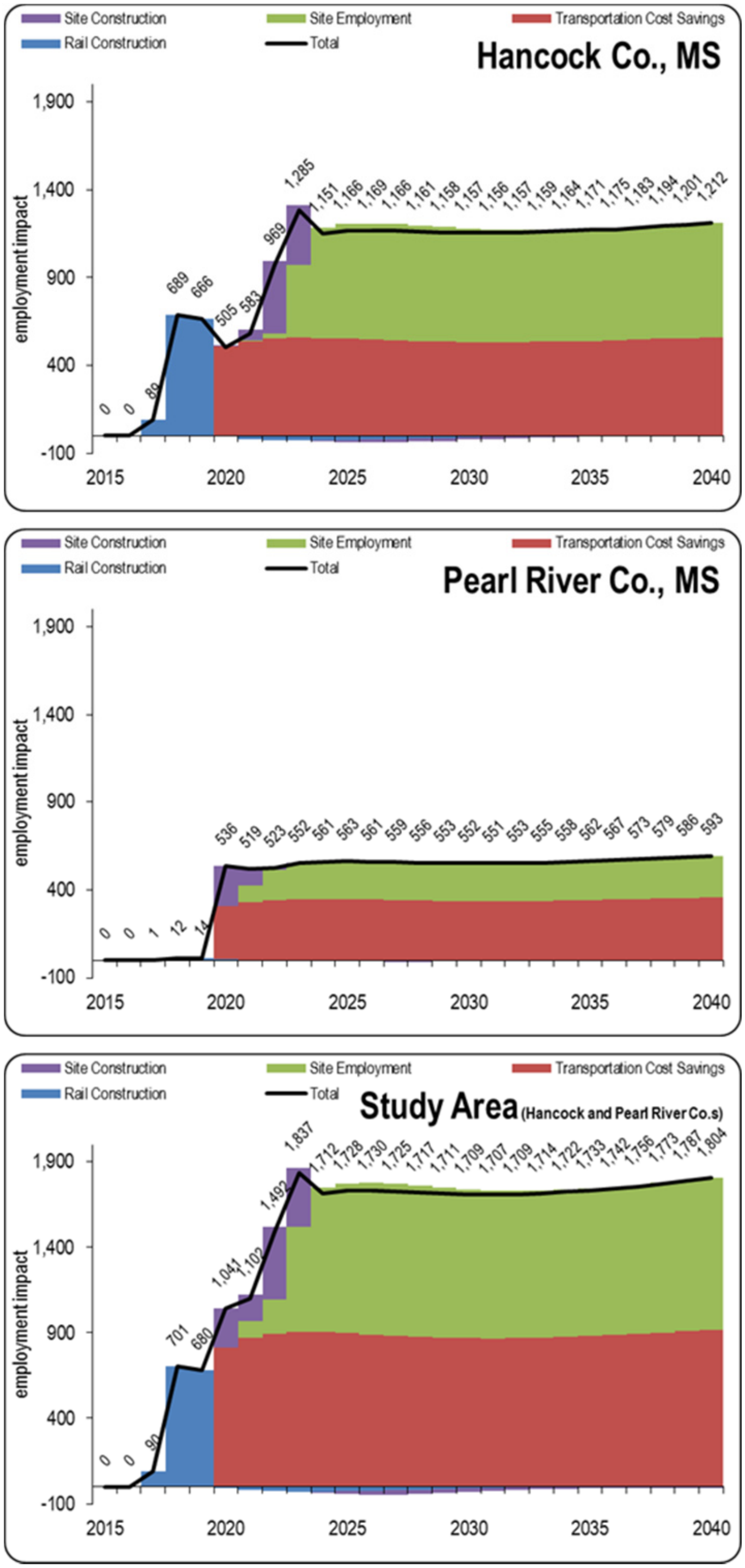
[42] Annual variances between 2020 and 2025 reflect how such impacts were entered into the various industries and between Hancock and Pearl River counties.

advantages in Hancock and Pearl River Counties due to the rail development, in comparison to the baseline scenario with only a monopoly rail service available. However, this short-term restructuring is short-lived (within three years), and the economic balancing evens over the remaining analysis horizon. The subsequent year 2024 to 2040 impacts reflect the result of the transport costs savings and new site employment.

Business Operation Impacts

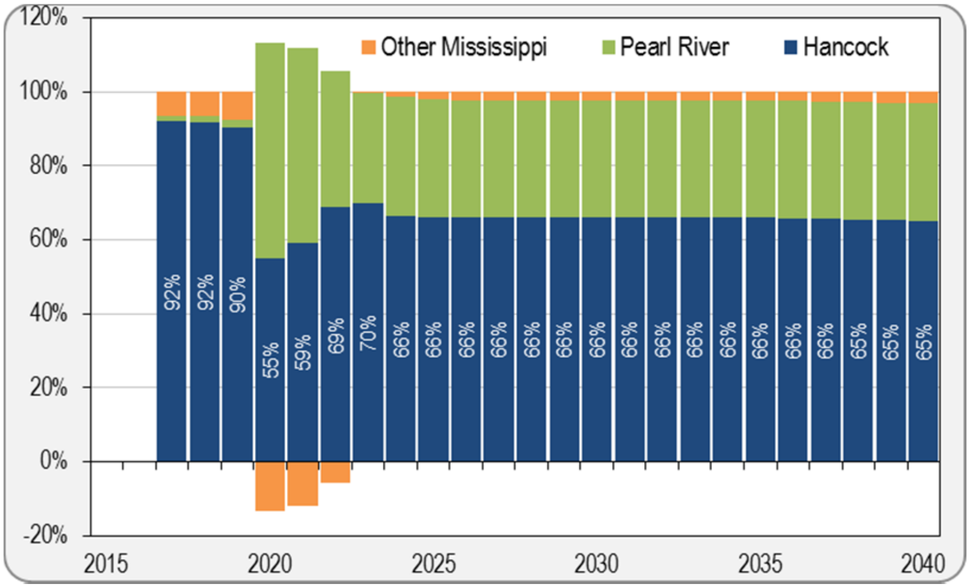
The resultant impacts associated with business transportation cost-savings and new site employment are evaluated from the five impact measure perspectives in Table B-8 for the years 2025 and 2040 (that is, following the rail and site construction-related impacts). In year 2025, for example, a total of 1,762 jobs would potentially arise in Mississippi because of the rail connection, of which a vast majority (98 percent, 1,762 jobs) occur in the Study Area. Nonetheless, the findings indicate that the project benefits the State overall.

Figure B-7 Job Impacts by Region and Component



Source: CDM Smith use of REMI

Figure B-8 Regional Job Impact Distribution



Source: CDM Smith use of REMI

Table B-8 Business Operation – Related Economic Impacts (2025, 2040)

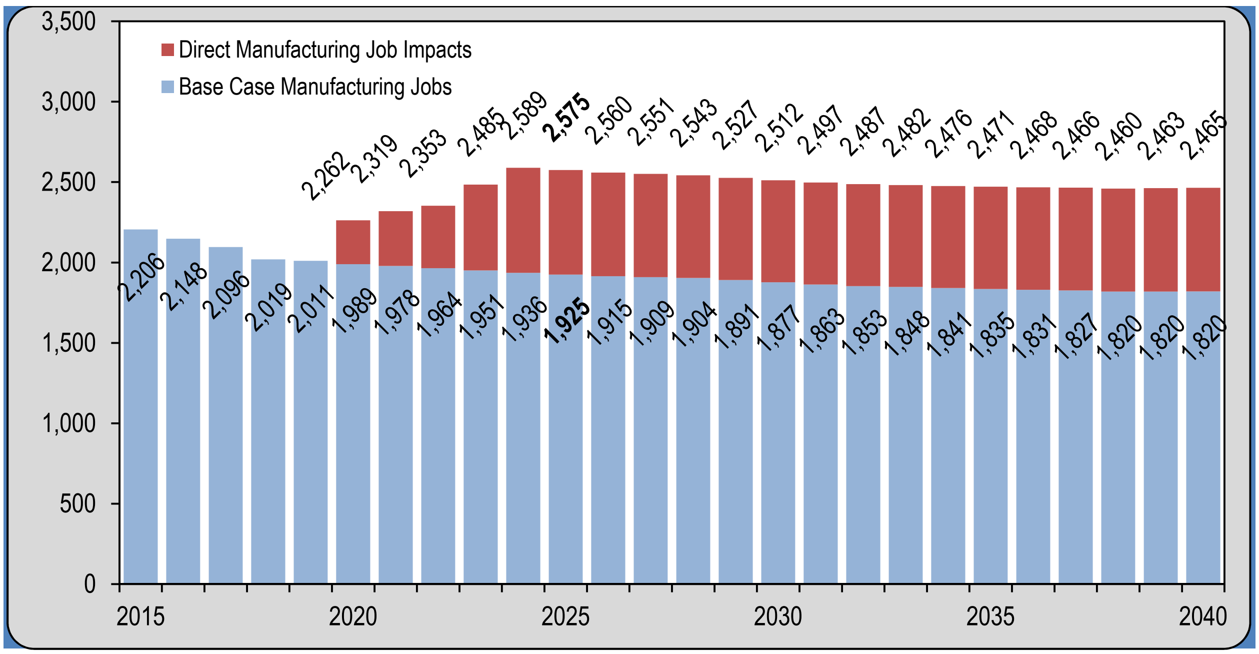
Measure	Absolute Change				Percent Change			
	Study Area			Mississippi	Study Area			Mississippi
	Hancock	Pearl River	Total		Hancock	Pearl River	Total	
Year 2025								
Population	656	644	1,300	1,450	1.3%	1.0%	1.1%	0.0%
Employment	1,166	563	1,728	1,762	4.1%	2.4%	3.3%	0.1%
Wages and Salaries*	$63.5	$20.7	$84.2	$86.9	5.9%	3.3%	4.9%	0.1%
Value Added*	$153.0	$40.6	$193.6	$198.9	7.0%	3.0%	5.5%	0.1%
Output*	$327.5	$80.7	$408.2	$417.4	8.4%	3.2%	6.4%	0.2%
Year 2040								
Population	1,537	1,448	2,985	3,339	2.9%	2.2%	2.5%	0.1%
Employment	1,212	593	1,804	1,862	4.0%	2.3%	3.2%	0.1%
Wages and Salaries*	$80.2	$25.1	$105.3	$108.9	6.0%	2.9%	4.8%	0.1%
Value Added*	$227.6	$54.0	$281.6	$291.5	7.8%	2.9%	5.9%	0.2%
Output*	$482.0	$105.1	$587.1	$603.4	9.5%	3.2%	7.0%	0.2%

Source: CDM Smith use of REMI
^ Reflects post rail and site construction impacts. Includes the business transport cost-savings, existing firm expansion, and new firm attraction, as well as the associated multiplier impacts.
* in millions of fixed 2012 dollars

Direct Manufacturing Employment Impacts

Base case and new direct manufacturing sector employment impacts associated with transport cost savings and new firm attractions are shown in Figure B-9, which expands upon the base-case manufacturing employment shown previously in Figure B-4 (depicted in the light blue color).[43] Per se, the chart depicts the baseline manufacturing jobs (i.e., 1,925 in year 2025) with the net-direct manufacturing job impacts stacked on top. Such direct manufacturing job impacts begin at 273 jobs in year 2020 and rise to 650 jobs by 2025. Resulting manufacturing jobs total 2,262 in 2020, rising to 2,575 by 2025. The relative change in Study Area manufacturing employment because of the rail connection starts at 13.7% in 2020 and rises to 33.8% by 2025.

Figure B-9 Direct Manufacturing Employment Impacts – Baseline and Build Impacts



Source: CDM Smith use of REMI

Economic Impact Conclusions

High Rail Transport Costs

Such high rail costs reportedly constrain existing firm expansion, and impose escalated operating costs from monopolistic rail pricing. Further concerns inhibit the attraction of new firms drawn to the region's overall transport infrastructure, abundant industrial acreage, and other amenities. Clearly, there is potential for the secondary rail connection to lower transport costs and help induce Study Area economic growth.

The magnitude of such growth is a challenging issue to forecast. In addition to the many positive factors that local business leaders have worked hard to bestow upon the region, there are many other factors beyond local control. Gas prices, inflation, trade patterns, natural disasters, market changes, etc. can thwart the best laid-out development plans.

---

[43] Note that the figure reflects the same base-case productivity gains (resulting in base-case manufacturing employment declines) as discussed in Section 1.2.1. This explains why the blue-bars decrease over the analysis period.

Impact Approach

Beyond the short-term impacts associated with rail construction, forecasts were made of the impacts associated with transportation cost-savings. Further, various data were used to derive new site employment impacts (as well as the associated site construction impacts). In summary, the projected economic impacts are notable and comparatively robust to the existing economy. Further, the forecasted impacts associated with such access would further strengthen the Study Region's ability to retain existing firms.

Study Area Impact Findings

Economic impact components evaluated include the short-term construction impact associated with the rail connection as well as new site development impacts. Beyond these impacts, the facility will lower transportation costs for existing rail-user firms, which will facilitate their expansion as well as help attract new industries.

- *Construction Impacts* – Rail construction impacts will attract approximately 680-700 Study Area jobs in years 2018 and 2019. Subsequent to that site development impacts of expanding and/or newly attracted firms will range between 150 to 425 jobs in years 2020 to 2023.

- *Site Development* – The new rail connection will lower transport costs and make the area more attractive to existing firm expansion and/or new firm attraction. Beginning in year 2020, it is estimated that 273 additional manufacturing jobs will be attracted to the Study Area. This manufacturing job attraction impact is forecasted to grow quickly to 650 by the year 2025. The expansion of Study Area manufacturing will generate an additional 1,154 multiplier jobs in the year 2025 for a total job impact of 1,178. Compared to Study Area baseline employment, the rail connection is forecasted to result in a 33.8% increase in direct manufacturing employment and a 3.5% in overall employment.

State Impact Findings

While a vast majority of the impacts would arise in the Study Area, additional positive impact would occur elsewhere in Mississippi. Hence the project can be viewed as beneficial to the overall State in addition to the Study Area.

Based on the detailed survey effort, discussion with local officials, and REMI modeling, the proposed rail connection would benefit the overall Study Area economy. By dramatically reducing rail transport costs and improving rail connectivity, the facility would help attract direct manufacturing investment. The objective economic evaluation presented herein also acknowledges that significant developable industrial acreage exists in the Study Area. Hence the Study Area possesses the capacity to accommodate additional potential development if/when other factors further increase the attractiveness of the Study Area for manufacturing-related investment.

Appendix C: Potential Funding Sources for Port Bienville Rail Improvements

The Port Bienville Short Line Railroad connecting the CSX rail line in Hancock County to the NS rail line in Pearl River County will most likely require funding from multiple sources. Funding options for this project may include grants or loans from public sources, private capital or in-kind contributions, or revenues from ongoing operations. Grants from federal or state governments generally do not require repayment except under specific conditions of non-performance. Loans require repayment based upon the terms agreed to in the loan document, often over a period of up to thirty years. The initial funding plan for this project will likely pursue federal and state resources; given the affect that current economic conditions are having on state and transportation funding these resources are evolving rapidly and availability will probably change as the economic environment improves.

Grants from Surface Transportation Programs

Grants funds can be targeted to specific projects that solve freight or passenger rail needs. In recent years, passenger rail has received greater attention and funding compared to freight rail projects. However, MAP-21 includes a renewed focus on the needs of freight rail infrastructure and services. Federal Railroad Administration (FRA) supports railroad projects through a variety of competitive grant, dedicated grant, and loan programs. The Transportation Investment Generating Economic Recovery (TIGER) competitive discretionary grant program, managed by USDOT's Office of the Secretary, is a USDOT-wide program that invests in rail, road, transit, and port projects. Freight rail projects such as the proposed Port Bienville Rail improvements may apply for TIGER Discretionary Grant funding. TIGER grants awarded in 2012 totaled nearly $500 million, and 12 percent of these grants (approximately $60 million) went to freight rail projects. Other current FRA grant programs do not target the extension of rail lines. Some of the grant programs outlined below require local or state matching funds, the match may vary depending upon a variety of factors.

Federal Grants and Loans

Transportation Loan and Credit Enhancement Programs

Transportation Infrastructure Finance and Innovation Act (TIFIA) and Railroad Rehabilitation and Improvement Financing (RRIF) are existing federal transportation loan program. The TIFIA credit program offers direct loans, loan guarantees, and standby lines of credit for projects of all modes. These instruments are designed to address the varying requirements of projects throughout their life cycles. The amount of federal credit assistance may not exceed 33 percent of total eligible project costs. The program is designed to fill market gaps and leverage limited federal resources and substantial co-investment by providing projects with supplemental or subordinate debt rather than grants. The project's estimated eligible costs must be at least $50 million or 50 percent of the state's annual federal-aid highway apportionments, whichever is less. TIFIA requires an investment grade rating on senior debt (or on the TIFIA debt, if no debt senior to TIFIA exists). The project must be supported in whole or in part by user charges or other non-federal dedicated funding sources, and must be included in the state's transportation plan. TIFIA projects must appear on the applicable State Transportation Improvement Program, but the state DOT does not have to be the borrower. Public freight-rail facilities or private facilities providing public benefit for highway users, intermodal freight-transfer facilities, access to such freight facilities, and service improvements to such facilities are all eligible for TIFIA assistance.

RRIF provides direct loans and loan guarantees to acquire, improve, or rehabilitate intermodal or rail equipment or facilities including track, components of track, bridges, yards, buildings and shops; to refinance outstanding debt incurred for the purposes listed above; and to develop or establish new intermodal or railroad facilities. Direct loans can fund up to 100 percent of a railroad project with repayment periods of up to 35 years and interest rates equal to the cost of borrowing to the government.

State Infrastructure Banks (SIBs) are revolving infrastructure investment funds for surface transportation that are established and administered by states. SIBs give states the capacity to significantly leverage federal resources by attracting non-federal public and private investment. SIBs are capitalized with federal-aid surface transportation funds and matching state funds. Several states have established SIBs or separate SIB accounts capitalized solely with state funds. As loans or other credit assistance forms are repaid to the SIB, its initial capital is replenished and can be used to support a new cycle of projects. Under the current MAP-21 program states and territories are authorized to enter into cooperative agreements with the Secretary of Transportation to establish infrastructure revolving funds eligible to be capitalized with federal transportation funds. SIB legislation authorized highway, transit, and rail accounts. Mississippi has not established a SIB, but reauthorization of SIB legislation may open opportunities for this funding mechanism.

Section 11143 of Title XI of SAFETEA-LU amended Section 142 of the Internal Revenue Code to add highway and freight transfer facilities to the types of privately developed and operated projects for which private activity bonds (PABs) may be issued. This change allows private activity on these types of projects, while maintaining the tax-exempt status of the bonds. No substantive changes have been made to the PAB program by MAP-21 or any other legislation. Components of the Port Bienville Short Line Railroad could be eligible for this program.

Economic Development Administration Investment Programs (EDA)

The U. S. Department of Commerce, Economic Development Administration (EDA) provides loans and grants for counties on a competitive basis. Investment programs for the counties of Hancock and Pearl River are coordinated through South Mississippi Planning and Development District (SMPDD). Through the Public Works program, EDA provides investments to help distressed communities build, design, or engineer critical infrastructure and facilities that will help implement regional development strategies and advance bottom-up economic development goals to promote regional prosperity. The Public Works program provides resources to meet the traditional infrastructure needs of communities, and offers resources to help distressed communities become more economically competitive through the construction or design of 21st century infrastructure. Investments made through the Public Works program must be aligned with a current regional economic development strategy and must clearly lead to the creation or retention of long-term jobs.

Through the Economic Adjustment Assistance program (EAA), EDA provides investments that support a wide range of construction and non-construction activities, including infrastructure, design and engineering, technical assistance, economic recovery strategies, and capitalization or re-capitalization of Revolving Loan Fund (RLF) projects, in regions experiencing severe economic dislocations that may occur suddenly or over time. EDA utilizes EAA investments to provide resources that help communities experiencing or anticipating economic dislocations to plan and implement specific solutions to leverage their existing regional economic advantages to support economic development and job creation. Like Public Works investments, EAA investments are designed to help communities catalyze public-private partnerships to foster collaboration, attract investment, create jobs, and foster economic resiliency and prosperity.

Community Development Block Grants (CDBG) Programs

The U.S. Department of Housing and Urban Development provides Community Development Block Grant program (CDBG) funds to entitlement cities and counties and funds states to support eligible projects in non-entitlement communities. Eligible local governments compete on an annual basis for CDBG funds through the Mississippi Development Authority, Office of Community Services.

Mississippi's CDBG program provides funds to eligible local governments that submit a specific project that meets the program's state and federal eligibility requirements. In accordance with the Community Development Act of 1974, as amended, project activities must meet at least one of the following national objectives:

- Benefit low- and moderate-income persons
- Aid in the prevention or elimination of slums or blight
- Meet urgent needs because existing conditions pose a serious and immediate threat to the health or welfare of the community and other financial resources are not available to meet such needs

A local unit of government may apply for CDBG funds in either the Public Facilities or Economic Development category. The Public Facilities category makes available funding for public improvements such as water, wastewater, drainage, streets, and certain public buildings. This category includes a regular competition for funds as well as special small government and emergency competitions. Some public facilities projects may be funded under the stringent Urgent Needs/Emergencies national objective. Such projects must prove a particular urgency because existing conditions pose a serious and immediate threat to the health or welfare of the community, and must meet other criteria such as the date of occurrence of the emergency condition. The Economic Development category provides funding to the local units of government for eligible infrastructure improvements such as drainage, water and sewer, roads, bridges, and rail spurs in support of business start-ups and expansions. Job creation is the key to CDBG-assisted economic development efforts. CDBG-Disaster funds are being used at the Port of

Gulfport and the program is being closely monitored for compliance with job creation goals to benefit low- and moderate-income persons, as established in the grant authorization.

State of Mississippi Grant and Loan Programs

RESTORE Act – BP Oil Settlement Funds

Although the final allocation of funds has not been determined, the RESTORE Act will provide BP oil spill settlement funds to the Gulf coast states of Alabama, Mississippi, Louisiana, and Texas. Funds for Mississippi are expected to provide several hundred million dollars, primarily for projects to benefit the Gulf coast communities impacted by the oil spill. Funds from this program could provide significant resources in support of this project.

Mississippi Department of Transportation

In addition to federal funding, many states provide funding for freight rail projects. In most cases, state programs were initiated by the federal rail service assistance program established by the Railroad Revitalization and Regulatory Reform Act (4R Act), and amended by the Local Rail Service Assistance Act of 1978 (LRSA). The LRSA program provided funding on a federal/local matching share basis for four types of projects: rehabilitation, new construction, substitute service, and acquisition. The LRSA Program permitted states to provide funds on a grant or loan basis. LRSA was updated in 1990 to the Local Rail Freight Assistance program (LRFA) and the criteria for lines eligible to receive assistance were revised. Funds for the program were dramatically reduced in the 1990s, and congressional appropriations ceased in 1995. Despite the lack of federal funds, many states have continued their freight rail assistance programs through remaining LRFA funds (repaid loans) or through apportionment of state funds. The objectives of most of these programs have been job retention, economic development, and safety. More recently, benefits accrued to highway congestion mitigation and avoided highway costs are being considered.

Transportation finance at the state level in Mississippi (via MDOT) is dominated by a series of user-based revenues. The most prominent of these revenues are the state motor fuel tax, tag fee, and privilege tax. Mississippi also receives contract authority in the form of federal-aid apportionments as authorized by ISTEA and its successor legislation (TEA-21, SAFETEA-LU, and MAP-21). MDOT shares state-generated user fees with local governments. Counties receive a significant portion of the state motor fuel tax and the state privilege tax, while municipalities receive a small share of the state motor fuel tax. Counties and municipalities also share federal funds (STP and HBP) with MDOT. A substantial share of local transportation funding is derived from portions of local real estate property taxes, bonds, and the personal property tax.

In addition to MDOT programs, the Mississippi Development Authority (MDA) manages several programs for job creation that can support infrastructure improvements. Several of these programs receive federal funding, so caution must be taken in ensuring that federal funds are not treated as local match requirements.

Mississippi Freight Rail Service Projects Revolving Loan/Grant Program (RAIL)

The Mississippi Freight Rail Service Projects Revolving Loan/Grant Program (RAIL) administered by MDA is designed to make loans and grants to municipalities and counties to finance freight rail service projects in the State of Mississippi. Counties and municipalities are encouraged to use these funds in connection with other state and federal programs. Funding for loans and grants to applicants is derived from the issuance of state bonds. RAIL was enacted by the state legislature during the regular 1995 session. The governing authority of a municipality or county is eligible to apply for this program. Under this program, a project which involves the acquisition, construction, installation, operation, modification, renovation, or rehabilitation of any freight rail service facilities is eligible. Also eligible are projects which may include any fixtures, machinery, or equipment used in conjunction with any freight rail service facilities, including construction costs (including reasonable and customary site work for buildings, right of ways, easements, etc.). The grant program permits a maximum amount of $250,000 per project. Under the loan program, the cumulative maximum loan amount is limited to $1 million per project per calendar year. Up to eight percent of the principal loan amount may be used for design work (i.e. engineering or architecture). Engineering and/or architectural costs above eight percent may be paid from other funding sources. Loans made under the Freight Rail Service Revolving Loan Program may be for a maximum of fifteen years, in amounts not to exceed $1 million per project per calendar year. The annual interest rate on these loans is 1 percent below the Federal Reserve Discount Rate at the time of loan approval. Funding is derived from the issuance of state general obligation bonds.

Mississippi Capital Improvements Revolving Loan Program (CAP)

The Capital Improvements Revolving Loan Program provides loans to municipalities and counties for the improvement of public facilities and infrastructure to assist business locations and expansions with community based projects. Rail spurs, roads, and bridges are included as eligible projects. County and municipal governmental authorities in Mississippi may apply for loans under this program. Industries that are eligible under this program include manufacturers, warehouses and distribution centers, research and development facilities, hospitals, telecommunications and data processing facilities, and national or regional headquarters. Loans made under the Capital Improvements Revolving Loan Program may be made for a maximum of twenty years, in amounts not to exceed $1 million per project. The annual interest rate on these loans is 3 percent for taxable activities and 2 percent for tax-exempt activities.

Mississippi Rural Impact Fund Grant Program (RIF)

The Rural Impact Grant Fund (RIF) provides funding for publicly owned infrastructure needs. Funding from this program can be used by rural communities to assist with the location or expansion of businesses. Use of the funds must be directly related to the construction, renovation, or expansion of industry. Eligible projects include transportation facilities directly affecting the site, including roads, bridges, rail lines, or pipelines. Job creation is the goal of the Rural Impact Fund Grant Program. Industries eligible under this program, which must create ten new full-time jobs, include manufacturers, warehouses and distribution centers, research and development facilities, telecommunications and data processing facilities, and national or regional headquarters.

A rural community is defined as a municipality with a population of ten thousand or less, or a county with a population of thirty thousand or less, according to the most recent federal decennial census at the time the application is submitted. The rural community must apply on behalf of a new or expanded industry based on the public infrastructure needs of the project. The

Rural Impact Fund Grant Program provides for a maximum grant amount of $150,000 per project. No funding was available in this program for 2012. Although this program does not represent a viable funding source for project construction, these funds could support development of rail improvements for specific businesses that would access the dual Class I rail services proposed in this study.

Mississippi Development Infrastructure Grant Program (DIP)

The Development Infrastructure Grant Program (DIP) is available to fund publicly-owned infrastructure. Funding from this program can be used by municipalities and counties to assist with the location or expansion of businesses. Use of the funds must be directly related to the construction, renovation, or expansion of industry. Transportation facilities directly affecting the site, including roads, bridges, rail lines, or pipelines are eligible projects. Job creation is the goal of the Development Infrastructure Grant Program. Municipalities and counties must apply on behalf of a new or expanded industry based on the public infrastructure needs of the project. The Development Infrastructure Grant Program provides for a maximum grant amount per project of $150,000. Although this program does not represent a viable funding source for project construction, these funds could support development of rail improvements for specific businesses that would access the dual Class I rail services proposed in this study.

Mississippi Port Revitalization Revolving Loan Program

The Mississippi Port Revitalization Revolving Loan Program is available to provide loans to state, county, or municipal port authorities to assist with the location and expansion of businesses and for the improvement of port facilities. Rail spurs are eligible projects. Job creation and the improvements of ports are the goals of the Port Revitalization Revolving Loan Program. State, county, and municipal ports authorized to operate in Mississippi may apply for loans for the port or on behalf of a new or expanded industry. Loans made under the Port Revitalization Revolving Loan Program may be made for a maximum of ten years, in amounts not to exceed $750,000 per project. The annual interest rate on these loans is 3 percent.

Mississippi Business Investment Act Loan Program (MBIA)

The Mississippi Business Act Loan Program is available to provide loans for public infrastructure. Funding from this program can be used by municipalities and counties to assist with the location or expansion of businesses. Job creation and private investment are the goals of the Mississippi Business Investment Act Program. Municipalities and counties may apply for loans on behalf a new or expanded industry based on the public infrastructure needs of the project. Loans made under the Mississippi Business Investment Act Loan Program may be made for a maximum of ten years. The amount of the loan is negotiated with the Executive Director of the Mississippi Development Authority, but cannot exceed $15,000 per job created by the eligible business and is matched by one dollar of state money for each three dollars of private investment by the eligible business. The annual interest rate on these loans is negotiated by the Executive Director of the Mississippi Development Authority.

Mississippi Development Authority Development Infrastructure Grants

MDA provides grants to publicly-owned infrastructure used to facilitate the location or expansion of businesses. There must be a direct relationship to the construction, renovation, or expansion of industry for these funds to be allocated. Funding under this program can be used for transportation facilities including rail lines.

Bond Financing

General Obligation Bonds (GO)

Local political entities (cities or counties) with adequate financial liquidity have authority to issue general obligation bonds for the development of public infrastructure. General obligation bonds carry the full faith and credit of the issuing political entity.

Tax Increment Financing

A number of Mississippi communities have utilized Tax Increment Financing (TIF) as a financing mechanism for infrastructure and other community improvement projects. TIF financing allows a government or non-profit entity to capture the increase in tax revenues resulting from new businesses and use it to finance some or all of the cost of the improvements needed to attract the new businesses or new development to the community. Frequently these tax revenues are used to retire the debt from the issuance of bonds that provide the funding to cover the current cost of the infrastructure or other improvements. TIF provides a means to fund needed public improvements by borrowing against the future increase in property tax or sales tax revenues that will result from new or additional businesses that locate in the area served by the TIF improvements.

Public Improvement Districts – Special Assessment Districts

A portion of the funding for the extension of the rail connector could be generated from future rail users. A fee for services and for use of the rail infrastructure could generate some of the necessary revenues to support maintenance and improvements to the rail infrastructure, support the short line railroad's operating expenses, and provide other funds required to facilitate the needed rail services and infrastructure in the park in the future. Structuring an improvement district or assessment district could require additional review of existing legislation, as well as a market analysis to evaluate reasonable fees that support reasonable revenue generation, and also attract new and retain existing businesses in the industrial park and on other property that could be served by the dual Class 1 rail services made available as a result of this project.

Public – Private Partnerships

Public-private partnerships are contractual agreements formed between a public agency and a private sector entity that allow for greater private sector participation in the delivery and financing of transportation projects. Mississippi authorizes the Mississippi Transportation Commission, county boards of supervisors, and the governing authorities of municipalities to contract with other governmental agencies or private entities for the purpose of designing, financing, constructing, operating, and maintaining one or more new toll roads or toll bridges in the state. The toll road legislation does not specifically address railroad projects, but it demonstrates the willingness of the legislature to allow public-private partnerships.

Design-build is a project delivery method that combines two, usually separate, services into a single contract. With design-build procurements, owners execute a single, fixed- fee contract for both architectural/engineering services and construction. The design-build entity may be a single firm, a consortium, a joint venture, or other organization assembled for a particular project. Under the design-build-finance (DBF) procurement model, one contract is awarded for the design, construction, and full or partial financing of a facility. Responsibility for the long-term maintenance and operation of the facility remains with the project sponsor. This approach takes advantage of the efficiencies of the design-build (DB) approach and also allows the project sponsor to completely or partially defer financing during the construction phase of the project. Owner cash flow constraints and a desire to defer payment are two primary reasons that project sponsors use DBF procurements.

In cases where a project sponsor has cash flow constraints, the sponsor will identify the level of funding that it has available for the project at the time the procurement is released and will require the design-build entity to finance any development costs in excess of that amount over a specified period of time. In other cases, an owner may specify the maximum amount that it can pay a design-builder each year for a project, called Availability Payments. That specified amount and the overall cost of the project would, in turn, drive the length of the repayment period.

Other DBF procurements may be motivated by the sponsor's desire to defer payment for the project. This motivation could be due to lack of current funding or the desire to use the deferred payment to incentivize the design-builder to accelerate the construction of the DBF project. Deferred payment DBF arrangements approximate design-build-finance-operate-maintain (DBFOM) P3 procurements, but without the design-builder assuming long-term operations or revenue risk. In this case, the project sponsor issues a procurement asking bidders to provide the cost for developing the project today, with the payment of that amount promised at a later time.

The advantages to DBF are similar to those of the DB approach, in that the project sponsor can capitalize on the efficiencies of having the design-builder undertake the design and construction of the project simultaneously. With the DBF approach, the short-term financing of all or a portion of the project is also assumed by the private sector. This allows sponsors to advance the construction of the project prior to assembling all of the funding required for the project. The DBF model is particularly beneficial if short-term gap financing provided by the design-builder allows the sponsor to expedite project implementation.

A DBF arrangement is a deferred payment and is not considered debt under usury law. Legally, the project sponsor is purchasing construction services and deferring payment for them. Rather than lending money, the practice involves accepting payment at a later date. The payments themselves can range from small deferred amounts to a schedule of payments over time or payment at the end of the project. For this reason, DB legislation does not usually address financing.

Private Resources

Norfolk Southern Railroad

Based on conversations with staff from Norfolk Southern Railroad (NS), the railroad may be willing to donate the right-of-way owned by NS that is associated with the unused rail line from Nicholson to the Stennis Space Center, or improve this rail line to an agreed- upon point and donate the remaining right-of-way as an in-kind contribution in support of the construction of this rail line. Additional negotiations with Norfolk Southern will be required; however, this is an important contribution in support of this rail project.

Appendix D: Current Study Area Rail Movements and Impacts

As part of the 2011 State Rail Plan prepared by CDM Smith recent Mississippi rail freight flows were economically modeled using the Implan model to understand existing (e.g., year 2009) employment and economic activity associated with the shipment and/or receipt of MS rail freight. To provide additional comparative analysis for this report, the economic impact forecasts derived in this report and the Transearch data were reviewed in conjunction with the Implan model to ascertain year 2009 Study Area employment and economic activity. The underlying objective ensures that the economic impact forecasts of the proposed rail connection are relatively comparable to the previously estimated impacts when parsed for the Study Area.

Study Area Freight Flows

County rail movements observed from the Mississippi Rail Plan (2011) were reviewed to understand recent rail commodity flows into/out of Hancock and Pearl River counties. While the data reflect year 2006 movements, the commodity mix and overall magnitude of movements has not changed significantly. Plastic matter is the predominate commodity currently moved by rail in the Study Area.

Specifically, nearly $850 million worth of plastic matter moved into or out of the Study Area by rail in 2006. Plastic matter comprised about two-thirds of rail tonnage movements and 90% of rail value for the two counties. Of the 362,798 tons of plastic matter shipped, 12% are inbound (to Pearl River) and 88% are outbound (from both Hancock and Pearl River). The value of such movements averages $2,340 per ton. Study Area rail tonnage, carloads, and values are shown by flow direction and commodity type in Table D-1.

The State Rail Plan used the Transearch commodity flows to estimate the year 2009 economic impacts associated with rail freight movements (based on the detailed year 2006 flows). This same process was used to quantify the year 2009 impacts associated with rail freight movements originating or terminating in Hancock and Pearl River Counties. Such impact estimates provide a context of the current value of rail service to the local and State economies. The Implan model is outlined below, as are the summary economic impact findings presented in the Plan. This process is then applied to freight flows originating/terminating in Hancock and Pearl River Counties. Doing so provides a snapshot of the year 2009 economic impacts associated with firms that use rail service to transport goods and materials.

State Rail Plan Findings

Rail freight activity in Mississippi supported an estimated 150,950 *total* jobs across the State. A vast majority of these *total* employment impacts arise from rail users who trade goods via the rail system, with the balance attributable to rail transport services. In terms of jobs, *trade-user* related employment impacts total 147,450 jobs (97.7% of total jobs), versus 3,500 (2.3%) *rail transport-service* related jobs. These summary rail-operation and rail-user impacts include the *direct* impact of goods and services provided, and the multiplier impacts associated with suppliers and income re-spending.

Study Area User-Firm Rail Impacts

In the year 2009, an estimated 1,470 people, earning $92 million, were employed by rail-user firms in Hancock and Pearl River Counties. The indirect supplier effects and induced re-spending effects resulted in an additional multiplier employment impact of 2,340 jobs. Combined, 3,820 jobs, earning an estimated $184 million in income, produced $1.6 billion in output, resulting in a net contribution of $379 million to the State's GSP.

Table D-1 Study Area Rail Freight Movements (2006)

Commodity by Direction	Tons	Railcars	Value $(Million)	**Value per Ton**
Inbound				
Hancock County				
Locomotives Or Parts	4,000	40	$8.6	$2,150
Railroad Cars	7,190	324	$12.3	$1,710
Subtotal	11,190	364	$20.9	$1,870
Pearl River				
Misc Indus Inorganic Chemicals	7,960	80	$2.6	$330
Plastic Mater Or Synth Fibres	44,432	520	$94.0	$2,120
Nonmetal Minerals, Processed	137,494	1,440	$47.0	$340
Railroad Cars	10,000	80	$21.6	$2,160
Subtotal	199,886	2,120	$165.2	$830
Total Inbound	**211,076**	**2,484**	**$186.1**	$880
Outbound				
Hancock County				
Plastic Mater Or Synth Fibres	221,924	2,320	$526.5	$2,370
Chemical Preparations, Nec	3,840	40	$3.8	$990
Railroad Cars	1,620	1,620	$3.5	$2,160
Subtotal	227,384	3,980	$533.8	$2,350
Pearl River				
Gravel Or Sand	7,938	80	$0.0	$0
Plastic Mater Or Synth Fibres	96,442	1,000	$228.8	$2,370
Subtotal	104,380	1,080	$228.8	$2,190
Total Inbound	**331,764**	**5,060**	**$762.6**	$2,300
Total Movements				
By County				
Hancock County	238,574	4,344	$554.7	$2,330
Pearl River	304,266	3,200	$394.0	$1,290
Total Study Area	542,840	7,544	$948.7	$1,750
By Commodity				
Plastic Mater Or Synth Fibres	362,798	3,840	$849.3	$2,340
Nonmetal Minerals, Processed	137,494	1,440	$47.0	$340
Other	42,548	2,264	$52.4	$1,230
Total Rail Movements	542,840	7,544	$948.7	$1,750

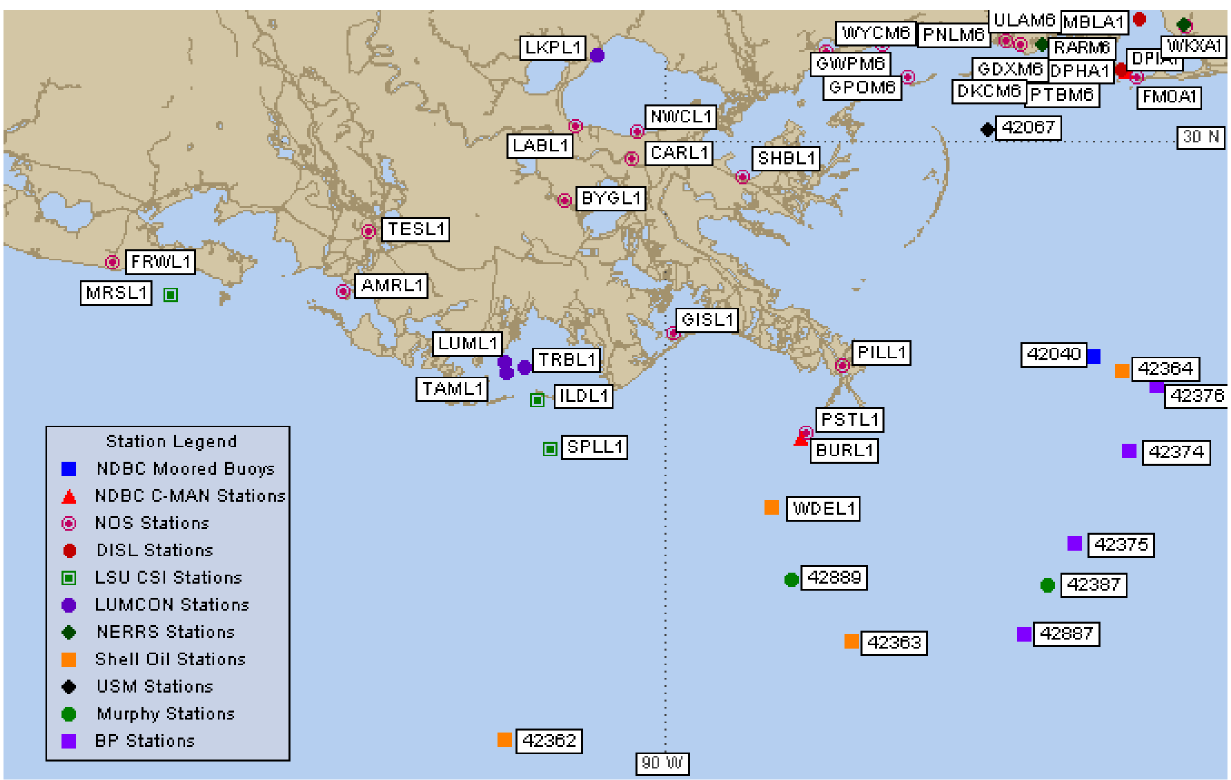
Source: MS State Rail Plan, Transearch data, Wilbur Smith Associates

Appendix E: Stennis Space Center

Stennis Space Center currently employees 5,500 people; thirty percent of those employees are scientific or technical personnel, twenty-five percent are business or professional staff, and twenty-five percent are classified as technical, crafts or production personnel. The technology and research being conducted at the center is cutting edge. An example of that expertise is the ongoing research and development at the National Data Buoy Center (http://www.ndbc.noaa.gov/rmd.shtml) at Stennis Space Center. The map below shows a small portion of the NDBS's weather and ocean platform network that includes over 150 data buoys deployed at coastal stations and offshore waters virtually around the world. These data buoys are developed, designed, manufactured, calibrated, repaired, and monitored in real-time at Stennis. The data buoys and over 700 platforms collect and disseminate information used by shippers, ocean vessels, and even communities connected to their tsunami detection system. These buoys are heavy and oversized (3, 6 and 12 meters). Because rail is no longer available to Stennis these over-sized loads are shipped by flatbed truck, and the time and cost factors for shipping are significant. Currently thirty to fifty buoys are deployed annually through strategic ports. Inbound shipments for manufacturing the buoys include steel hauls, steel cable and chain, and concrete.

Click on the link above, find the map below on the website, click on buoy 42067, and watch the ocean activity off the Coast of Hancock County.

Figure E-1 Louisiana/Mississippi Coastal Region Recent Marine Data NOAA National Data Buoy Center



Source: National Marine Data Buoy System

At the close of the space shuttle program, NASA and Stennis announced they would partner with commercial interests to provide space travel and transportation. In this role Stennis has leveraged their facilities, acoustical buffer zone, and transportation infrastructure to attract a number of technology-based businesses, including Orbital Sciences Corporation and Antares, to locate at the space center. The secure facilities at Stennis are linked to 7.5 miles of canals used to transport material from the space center. The Stennis Space Center canal system is connected to the Pearl River through a canal lock system.[44] The center is also located north of I-10 and south of I-59 via state route 607. However, based upon information provided to the consultant team by Stennis officials, a number of prospective businesses have chosen not to locate at Stennis due to its present lack of access to rail. Because of the confidentiality associated with these business prospects Stennis staff was unable to provide detailed information regarding these opportunities.

[44] NASA Stennis Space Center, Environmental Resources Document

Appendix F: Hancock County Business Interview Guide

Hancock County
Business Interview Guide

Purpose:

This interview guide will be used to identify existing economic development assets, determine economic development issues and opportunities related to transportation develop an understanding of local economic conditions in the eyes of business stakeholders, and begin to understand existing supply chains in Hancock County and adjacent areas. A solid economic justification is needed to support the project moving forward to ensure wise investment of the funds involved.

PART 1: BACKGROUND ON BUSINESSS AND OPERATING CONDITIONS

1) Is this the company's the only location in the Gulf Coast region?

_____**YES** ⇒ Continue to Question 3

_____**NO** ⇒ Please list any other locations in the region

2) How many full-time employees does your company employ in Hancock County? _____________

If unwilling to provide an exact or approximate number please provide a categorical answer using the table below. Please check the category applicable to your firm:

A. ___ Over 1000 employees

C. ___ 500 - 999 employees

B.___ 250 - 499 employees

D. ___100 - 249 employees

E. ___ 50 – 999

F. ___ 25 – 49

G. ___ 10 – 24

H. ___ Less than 10

3) In the past 5 years has employment within your business at this location increased, decreased, or remained the same?_________same__________increased_____________decreased

4) How many years has your business been in operation at this location? _____________________

5) How would you classify your business?

________ Transportation and Warehousing

________ Aerospace Related

________ Manufacturing

________ Construction

________ Wholesale or Retail Trade

________ Other (specify) ____

6) What percentage of your products or services are sold:

________% Locally or Regionally (Hancock County and Adjacent Counties)

________% Mississippi (Other than Locally/Regionally)

________% Other Gulf Coast States Outside the Region (AL, LA, FL, TX)

________% Nationally (remaining states)

________% Internationally

7) How has your business changed in the past 5 years: (Circle all that apply)

a. Developed new products or services

b. Utilizing new technology and/or equipment

c. New customer demands affecting operations

d. Selling to new U.S. customers

e. Selling to new International customers

f. Declining demand for products or services

g. No measurable change

8) How do you anticipate your business will change in the future? (Circle all that apply)

a. Develop new products or services

b. Utilizing new technology and/or equipment

c. New customer demands affecting operations

d. Selling to new U.S. customers, if so where ______________________________

e. Selling to new International customers, if so where ________________________

f. Declining demand for products or services

g. Invest in additional locations

h. No measurable change anticipated

9) Place for general notes on business operations and facilities including facility size, presence of loading docks or other specific freight infrastructure, external versus internal space needs etc.

____

____

____

PART 2: TRANSPORTATION ACTIVITIES AND SUPPLY CHAIN

10) What are typical hours of operation of your Company's transportation (freight) activities?

a. Daytime only from __________ a.m. to _____________ p.m.

b. Day/Evening from __________ a.m. to _____________ p.m.

11) Does your firm own and/or operate any of its own transportation assets? If so, what types of equipment? **(Please check all that apply)**

__________ Private Truck Fleet

__________ Private Truck Fleet – Special Equipment (e.g., flat-bed, refrigerated, etc.)

__________ Private Rail Cars

__________ Rail Containers

__________ Boat or Barge - Explain:

__________ Other (specify) ____

OUTBOUND TRANSPORTATION

12) What are the primary products you ship from your location?
Please list product type and provide STCC code if known:

a ______________________________ b ______________________________

c ______________________________ d ______________________________

13) What are the primary markets/final destinations for these products? Please list the top states or countries; (if the market is within Mississippi, please list cities or counties).

a ______________________ b ______________________

c ______________________ d ______________________

14) Please describe how your products typically get from your plant/facility to your customers (modes, key routes, etc).

____

____

____

____

15) What markets / products do you anticipate will grow the fastest over the next 3-5 years?

a ______________________ b ______________________

c ______________________ d ______________________

16) Who exercises primary control over out-bound transportation decisions?
(If more than one answer applies please provide approximate percentage for each)

a. _________ Your company b. _______ Customers c. _________ A third party

17) What percentage of your outbound freight tonnage moves by: (Equal to 100%)?

a. Federal Express, UPS, other third party logistics firm _______
b. Truck/Road, other than drayage to a terminal _______
c. Truck to Train/Rail _______
d. Truck to Container Ship/Barge _______
e. Truck to Airplane _______
f. Direct to Rail Only _______
g. Rail to Container Ship/Barge _______
h. Other _______

INBOUND TRANSPORTATION

18) What are the primary products you receive at your location? Please list product type and provide STCC code if known:

a ______________________ b ______________________

c ______________________ d ______________________

19) What are the primary origins of these products? Please list the top states or countries; if the market is within Mississippi, please list cities or counties.

a ______________________ b ______________________

c ______________________ d ______________________

20) What percentage of your outbound freight tonnage moves by: (Equal to 100%)?

a. Federal Express, UPS, other third party logistics firm ________
b. Truck/Road, other than drayage to a terminal ________
c. Truck to Train/Rail ________
d. Truck to Container Ship/Barge ________
e. Truck to Airplane ________
f. Direct to Rail Only ________
g. Rail to Container Ship/Barge ________

PART 3: TRANSPORTATION NEEDS

21) In general, how well does the current transportation infrastructure meet your needs? What regional transportation infrastructure is in the most need of improvement?

____

____

____

____

22) Using a scale from 1 to 10, with 10 being the most important, how would you rank the following factors in terms of how they influence your inbound transportation arrangements? Also indicated whether the factor is improving or declining (+ / -).

IMPORTANCE TO YOU

a.	Transit time	1….2….3….4….5….6….7….8….9….10	+ / -
b.	On-time/just-in-time delivery	1….2….3….4….5….6….7….8….9….10	+ / -
c.	Cost (rates)	1….2….3….4….5….6….7….8….9….10	+ / -
d.	Loss and damage	1….2….3….4….5….6….7….8….9….10	+ / -
e.	Equipment availability	1….2….3….4….5….6….7….8….9….10	+ / -
f.	Shipment visibility / traceability	1….2….3….4….5….6….7….8….9….10	+ / -
g.	Safety of the carrier	1….2….3….4….5….6….7….8….9….10	+ / -
h.	Other:	1….2….3….4….5….6….7….8….9….10	+ / -

23) If "On-time/just-in-time delivery" is one of the crucial factors influencing your inbound transportation, please indicate what defines on-time relative to the appointment time:

____ minutes ___ hour(s) ___day(s) Other: ________________

Railroad Service Questions:

24) Do you currently use any railroad services to ship or receive products?

_______Yes ________No – If not, why not?

____

____

25) If you use rail services, what type of railroad carrier do you currently receive service from?

a. ___ Class 1 b. ____ Short line

c. ___ Both Class 1 and SL d. : Other / Don't know ____________________

Who is your primary rail carrier: ____?

26) What type of rail facilities do you use to for shipping or receiving products? Are any of these more important to your future business than others?

a. _________ Intermodal b. ________ Bulk transload

c. _________ Break bulk transload d. ________ Direct railcar service

27) What type of railroad equipment is used to move your products?

a. _______ Container b. _______ Box Car

c. _______ Hopper Car d. Tanker Car

e. _______ Other ______________________________________

28) How would you rate **RAIL** transportation based on the following performance factors? Also indicate whether the service factor has been improving or declining (+ / -).

		IMPORTANCE TO YOU	
a.	Transit time	1….2….3….4….5….6….7….8….9….10	+ / -
b.	On-time/just-in-time delivery	1….2….3….4….5….6….7….8….9….10	+ / -
c.	Cost (rates)	1….2….3….4….5….6….7….8….9….10	+ / -
d.	Loss and damage	1….2….3….4….5….6….7….8….9….10	+ / -
e.	Equipment availability	1….2….3….4….5….6….7….8….9….10	+ / -
g.	Shipment visibility / traceability	1….2….3….4….5….6….7….8….9….10	+ / -
h.	Other	1….2….3….4….5….6….7….8….9….10	+ / -

29) Are there any service or access improvements that would increase your current use of railroad transportation?

a. No

b. Yes, Please explain: ______________________________________

____

30) Do you anticipate that your rail freight tonnage (inbound and outbound) will grow over the next 5 years?

a. Yes

b. No

31) Estimated growth in your (inbound + outbound) freight tonnage over the next 5 years?

________ Percent

32) How do you think having access to two class one railroads would improve your transportation of materials and goods/supply chain?

33) What would you consider to be the greatest transportation strength in the region?

PART 4: REGIONAL BUSINESS ENVIRONMENT

34) What three attributes contribute the most to the economic success of your business, please check three:

________Skilled Workforce

________Growing local population

________K-12 Schools

________Small town appeal

________Lower fuel costs

________Access to Airport

__________Reasonable business costs

__________Quality public services

__________Accessibility of my business to my customers

__________Ability to retain quality Workforce

__________Higher skilled workforce

__________Access to Highways

________Other:____
Please specify

35) What are the three greatest challenges or threats to your business's economic success?

__________National economy

__________Transportation

__________Utility issues

__________Access to Airports

___________Local workforce

___________Limited availability of skilled employees

___________Decline in Industry Sector nationally

___________Access to Rail

__________Other:____
Please specify

36) Where are your major competitors located? ________________________________

37) Are there any advantages that your competitors have due to their location? ___________________

____

38) What advantages do you have over your competitors because of your location in Hancock County?

____

____

39) In your opinion, what are this area's greatest strengths as a place to do business? ___________

____

PART 5: EFFECTS OF REGIONAL DISASTERS AND TRANSPORTATION REDUNDANCIES NEEDED

The following questions are related to the effect of major disasters, particularly Hurricane Katrina on shipments and the transportation system. They are meant to help identify the need for back-up routes/redundancies in the system, particularly for rail access.

40) Was your business operating at the time of Hurricane Katrina and are you able to discuss the effects on your business. If yes, continue with this section. If no, conclude the interview. ____

41)) Recall from prior questions the importance of rail shipments for your business (or lack of importance), at the time of Hurricane Katrina was your business ____ more, _____less, or the same ____ in terms of dependence on rail shipments at that time compared to today.

42) Describe the level of damage to your business? ____

____

____

43) How many business days did you lose? ___________ Due to the Hurricane; __________Due to transportation damage making the shipment of materials and goods impossible.

44) Describe the particular transportation infrastructure damage that affected your business: _______

____

____

____

45) Did you find alternate ways to ship materials and goods? (Yes or No) _______. If yes, approximately how long did it take to get these alternative transportation plans in place? _______

46) Compared to your normal transportation services used to ship materials and goods, how much more did the alternative transportation plan cost on average? How much additional time was involved in the alternative plan for an average shipment?

Cost: (% more than normal):

____

Time (more than normal for an average shipment):

____

Thank you for your time and assistance!

cdmsmith.com

PORT BIENVILLE

Rail Alternatives Development

Technical Methodology Report

September 19, 2013

Presented to:

Mississippi Department of Transportation

In collaboration with:

Federal Railroad Administration

Hancock County Port and Harbor Commission

CDM Smith

in association with HDR

Port Bienville Rail Alternatives Development Technical Methodology Report

TABLE OF CONTENTS

Figures

CDM Smith

Appendices

Introduction

Project Approach

The alternative selection process for any transportation facility begins with the identification and quantification of a "universe" of preliminary alternatives and selection of reasonable alternatives that address the project objectives. To achieve the identification and evaluation of preliminary alternatives, selection of reasonable alternatives, and the recommendation of a preferred alternative in this project's aggressive schedule, a streamlined selection process was developed in regard to the NEPA process. The streamlined screening and selection process for this project incorporates geographic information systems (GIS), an automated corridor analysis tool called the Alignment Alternatives Research Tool (AART), limited field reconnaissance and data validation, engineering design criteria, and review and evaluation by the project team that consists of planners and engineers. The process also takes into account and incorporates client input, public and other stakeholder comments and concerns, as well as consideration of previous studies. The process is iterative in nature, providing a continuous quantification and comparison of impacts to an equal level of detail at each stage associated with the various alternatives, as they are modified based on design criteria, cost, and other considerations during project development. The remainder of this report provides a detailed explanation of the process that was utilized to determine reasonable corridor alternatives.

Study Area

The project study area is located in southern Mississippi near Louisiana. It extends from Nicholson on the northern end to the area between Pearlington and the Gulf of Mexico on the southern end. The Mississippi River forms the western boundary, and the eastern boundary extends between the Stennis International Airport and the town of Kiln. It has an area of 231 square miles.

The majority of the study area lies in Hancock County, but a portion surrounding Nicholson lies in Pearl River County. The predominant feature of the study area is NASA's Stennis Space Center, located near the center of the study area with a fenced-in area known as the "Fee Area" which encompasses approximately 22 square miles. Additionally, NASA's Stennis Space Center controls development rights on another 154.75 square miles surrounding the "Fee Area". This surrounding land is known as the "Buffer Area." Interstate 10 is the major highway in the study area. Interstate 59 passes through a small portion in the north. Other significant features are wetlands, forests, and open pit mines. The majority of the study area is very sparsely populated.

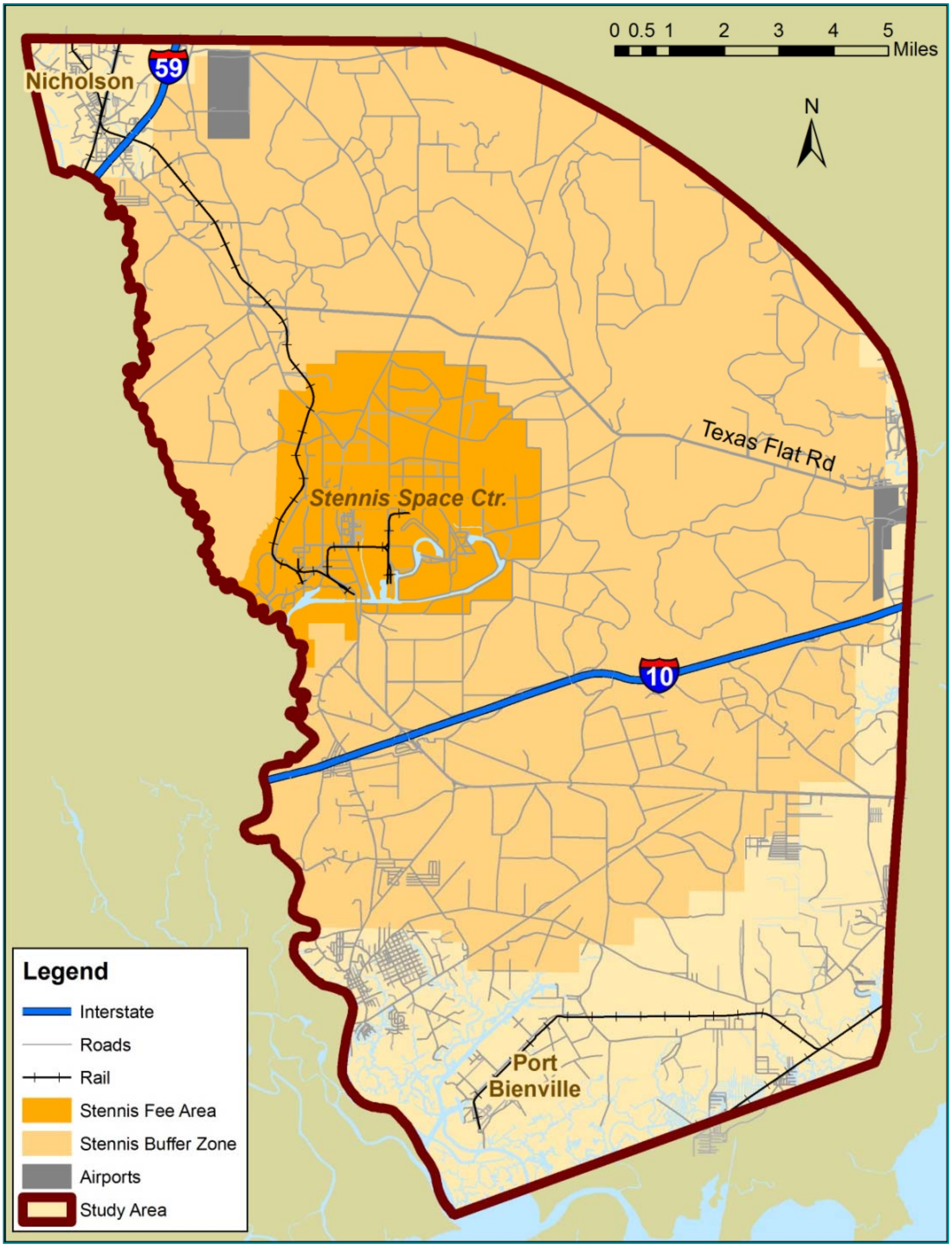


Figure 1 – Port Bienville Study Area.

Data Collection

Methodology

In order to create a complete picture of the project area, generate the best corridors and calculate accurate impacts, it was necessary to compile GIS data for the study area in the following categories: environmental, cultural, historical, and infrastructure. The majority of data were downloaded from the Mississippi Automated Resource Information System (MARIS) website (http://www.maris.state.ms.us/).

Historical data were obtained from the Mississippi Department of Archives and History (MDAH) through the Department's website.

Because the study area contains the NASA Stennis Space Center, it was necessary to submit a Freedom of Information Act (FOIA) request to obtain GIS data for areas inside the Center boundaries. Current aerial photography for the study area was provided by the Mississippi Department of Transportation (MDOT) via external USB drive.

Data for source water protection areas (SWPAs) were obtained through a direct request from the Mississippi Department of Environmental Quality (MDEQ). This data was deemed more accurate and current than the source water data available from the MARIS website.

As there was not a single comprehensive source for wetland information, the data for this layer was compiled from three sources: the US Army Corps of Engineers (USACE), MARIS, and Wetlands Solutions LLC. The USACE and Wetland Solutions LLC also provided data for proposed wetland mitigation banks.

No new GIS data were collected in the field for this feasibility study. With the exception of the mines layer, all of the GIS data were preexisting. Although there are a significant number of mines in the study area, there was no readily available GIS data layer showing their locations. The only available mine information was a list of mine locations containing township and range information obtained from the MDEQ. By using the list of mines, a township and range layer, a parcel layer and aerial photography, a new mines layer was created.

It is important to note that efforts were made to locate data for threatened and endangered (T&E) species within the study area. Fish and Wildlife was contacted regarding T&E species data and it was decided that the information was not in a format conducive to this study and the data was not provided to the project team. Therefore these data were not available for use in this Phase of the study. Fish and Wildlife did offer to check potential impacts to T&E species once the alternatives were identified. It was decided by the project team that this effort would be undertaken during Phase II after the reasonable alternatives have been identified.

Appendix D lists the data collected for this study and their sources.

Data Formats

Existing GIS data were obtained in shapefile, geodatabase and spreadsheet formats. Data in spreadsheets (MDAH historical data) were converted to GIS point layers.

Pre-Processing Techniques

Common Coordinate System

To facilitate the geoprocessing operations of the AART, all GIS data layers must be converted to a common coordinate system. The Port Bienville study area (Hancock and Pearl River counties) falls within the Mississippi State Plane Coordinate System – East, as described below:

Coordinate System:	Mississippi State Plane – East (FIPS 2301)
Projection:	Transverse Mercator
Datum:	NAD83
Unit:	US Foot

As the data were received, they were converted to this coordinate system.

Point Buffering

Some data that might represent large areas in the real world were available only as points. In instances where it was determined that it would create more meaningful AART output, point data were buffered by reasonable and defensible distances to convert them to polygonal data, thus giving them some dimension. These buffers provided additional protection to a certain resource or the creation of an extension of a site or resource to insure that it was identified during inventory of the alignments.

The features were combined into a GIS database as the next step to pre-processing in GIS. See Figure 2 for a diagram illustrating typical data preparation during this process.

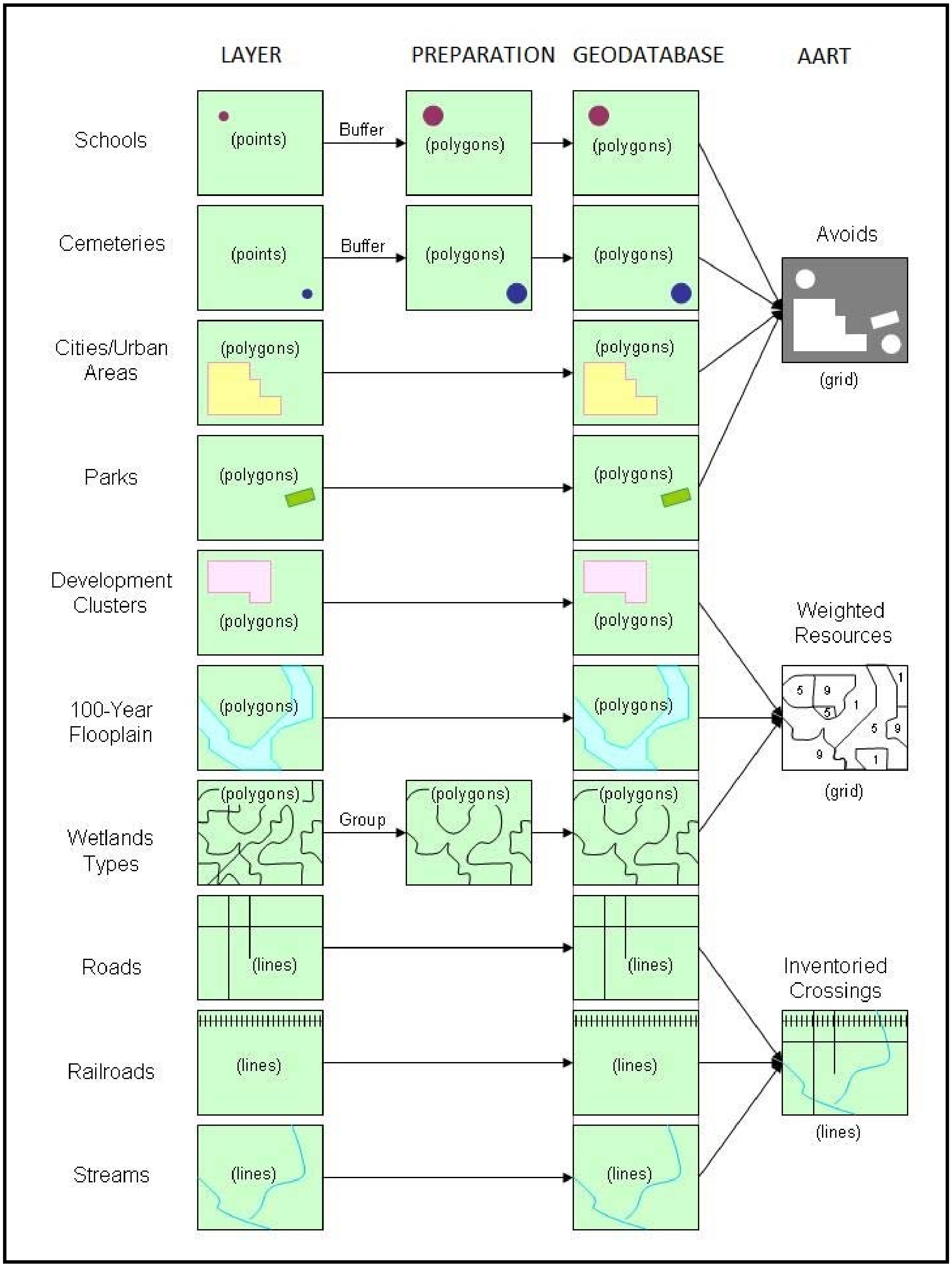


Figure 2 - Pre-processing for AART.

The first step in processing the data was to clip the GIS data using the study area boundary so that only features falling inside the study area are used. This helps to reduce processing time while running AART.

Next, to the extent possible a quality review of the data was conducted. Individual data layers were checked for locational accuracy against aerial photography. Because of the limitations inherent in this process, it is often only possible to detect gross errors and discrepancies in data layers. Data layers that did not contain features within the study area boundaries were not used in the analyses.

National Wetlands Inventory (NWI) GIS data are categorized into numerous codes which describe in detail the characteristics of each wetland polygon. In order to simplify the data, these codes were grouped into general categories based on wetland types. In addition, the original NWI codes were used to distinguish wetlands that have not been disturbed by man (non-disturbed) from those that have (disturbed). A summary of these groupings is shown in Appendix C. These groupings were applied to the NWI feature class in the geodatabase and used during the ranking process.

Grid Cell Size

Because AART conducts its analyses via raster processing, a grid (raster) cell size must be specified. This cell size determines the resolution of the grids when the input data layers are rasterized (converted to grids). Cell sizes that are too large will result in loss of detail and data; very small features may be lost in the rasterization process. On the other hand, cells sizes that are too small can severely impact processing times, strain computing resources and potentially exceed available disk space. For this project, a cell size of 20x20 feet was determined to be a reasonable compromise between detail and processing speed.

Evaluation Criteria for Preliminary Alternatives

Review and Classification of Data for AART

Avoids

As the term implies, areas designated as "Avoids" are avoided by the AART to the extent possible when determining the best alignments, allowing complete protection of the resources. However, in practice it is possible that some encroachment of these areas may occur during the smoothing process (when horizontal curvature criteria are applied) and when building corridors (for example, the wider the corridor, the greater the chance that an Avoid will be encountered). To minimize this possibility, a specified buffer width can be applied to the Avoid areas, thereby expanding its footprint.

During the GIS data evaluation process, the project Team and agencies identified some features as particularly sensitive and designated them as Avoids. These consisted of certain wetland, environmental, cultural and historical features as shown in Appendix E.

Ranked Resources

In contrast to Avoids, the assignment of a ranking does not guarantee that the area will not be impacted. Rather, the AART attempts to utilize the lower-ranked areas as much as possible while minimizing the overall length of the path/corridor. In some cases, AART may impact a few acres of highly-ranked areas if the overall impacts of the path are less than if those areas are avoided.

Once all of the layers have been ranked, the AART processes all of the layers and generates a single, composite "suitability" layer comprised of the highest rankings from all input layers. In other words, for each grid cell in the study area, the AART reviews each input layer, selects the highest value for that cell and assigns that value to the corresponding cell in the suitability layer (see Appendix B, Figure 4a).

In this study, rankings were developed by consensus among the various stakeholders, planners, engineers and domain experts. The initial step was to decide which layers should be included in the analysis. Next, each layer to be used was reviewed and rankings were assigned. See Appendix E for a detailed listing of all the rankings used in the study. Below is a summary of the GIS layers utilized and their rankings.

- Bays were programmed to be avoided.
- Estuarine and Marine Wetlands – tidal wetlands were programmed for avoidance and others were assigned rankings of 6 or 9 depending on their type and quality.
- Wetland Mitigation Banks were evaluated both as avoidance areas and with a ranking of 9. The results were almost identical for both scenarios.
- Freshwater Forested/Shrub Wetlands were initially assigned rankings between 4 and 9 depending on type. Later in the study these rankings were refined and were increased based on input from the Agencies to vary between 7 and 9.
- Bottomland Hardwoods were assigned a ranking of 6 or 7 depending on type.
- Freshwater Marshes were assigned a ranking of 6 or 9 depending on type.
- Savannahs were assigned a ranking of 6 or 9 depending on type.
- Rivers were programmed for avoidance for those with tidal influence. All other freshwater rivers were given rankings between 7 and 9.
- Lakes were assigned a ranking of 9.
- Water Bodies, (Linear and Areal) were assigned rankings of 6 and 9 respectively.
- Freshwater Ponds were assigned rankings between 4 and 7 depending on type.
- Prime Farmlands were assigned a ranking of 4.
- Landfills were assigned a ranking of 9.
- Surface Impoundment Areas were assigned a ranking of 9 along with a 500' buffer area.
- The following GIS features were all programmed as avoidance areas: Hazardous Waste Sites, RCRA, EPA, Tanks, Toxic Release Inventory, UST's, CERCLA 2008, CERCLA Site Areas, and Mines.

Rail Corridor

During initial discussions with project stakeholders, it was decided that the existing rail line from I-59 near Nicholson, MS to Texas Flat Road should be considered as the northern segment of the alternatives. This is an existing rail line that is no longer in service. The right-of-way and track is owned by Norfolk Southern and was originally constructed to serve Stennis. This rail line is an established corridor/roadbed and connects to the NS lead track in Nicholson. Utilizing this rail alignment would minimize impact to the environment and the cost would be less compared to constructing a new track. Since the track hasn't been used in over a decade it will have to be reconditioned since there has been no apparent maintenance in recent years. In order to encourage the AART to follow this path, a GIS layer consisting of a 1,000-foot corridor was created centered along this rail line. The corridor was assigned a ranking of "1" and superimposed on the final suitability layers so that the rail corridor would be the most suitable land in the vicinity. This process was performed to simply encourage the AART to identify this section of track as a possible alternative and to quantify the impacts associated with the initial wide corridor. In reality the impacts would be negligible since the rail bed is already established. Figure 3 shows the location of this corridor which is highlighted in yellow. The rail line is shown extending down into the Stennis "Fee Area" but portions of this track have been removed.

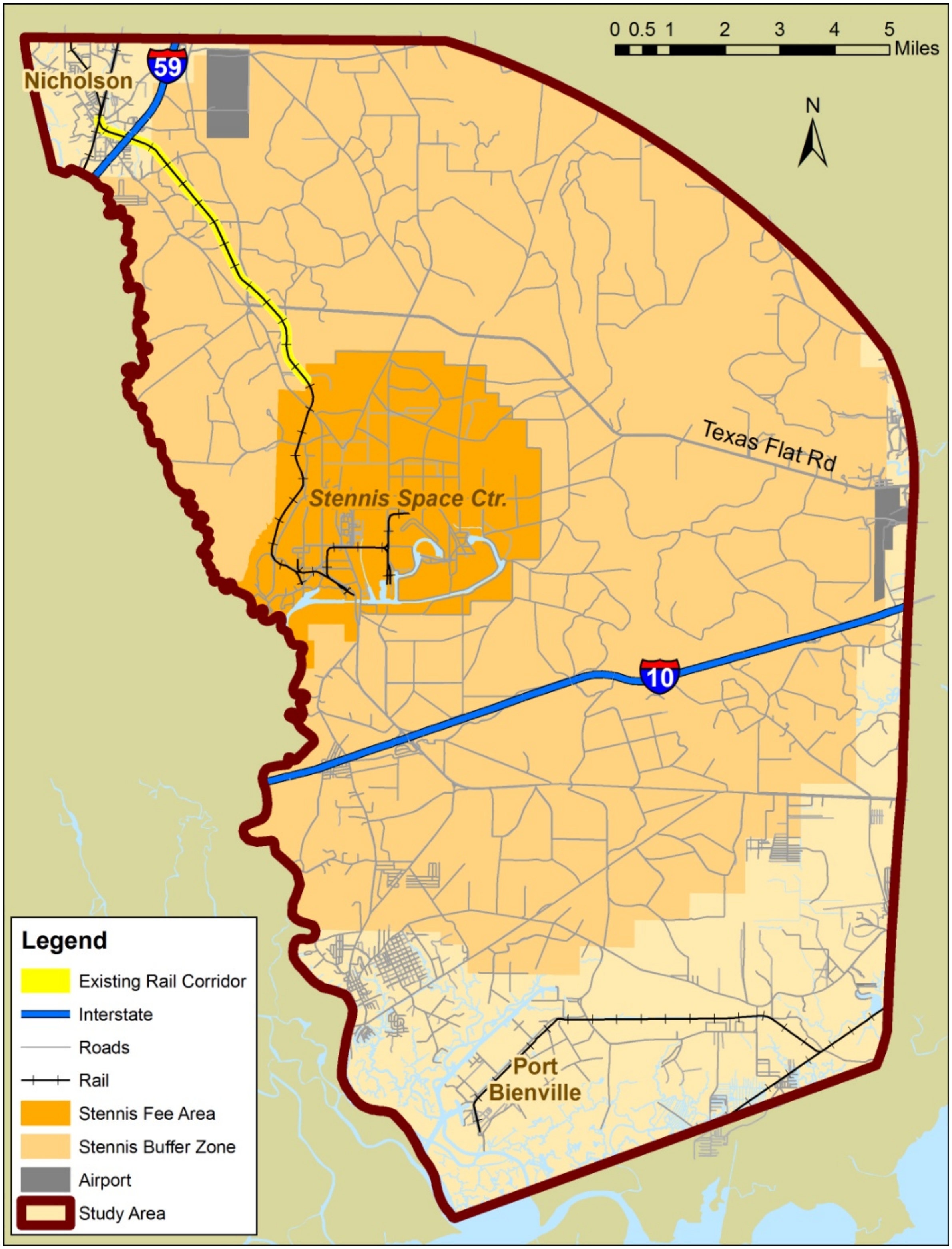


Figure 3 – Existing rail corridor used as part of all output corridors.

Scenarios

A "Scenario" is a specific combination of rankings and avoids. An initial, or "base", scenario was developed by the project Team. Variations of this base scenario were created which included or excluded certain avoids such as the Stennis Space Center Fee area and existing and proposed mitigation banks. These initial scenarios were used to generate an initial set of corridors ("runs") which were presented to the resource and regulatory agencies. Following further review and discussion, the agencies were given the opportunity to modify the rankings to create new scenarios based on their input.

Overall, seven scenarios were created from the Team's initial settings, four from EPA modifications and three from USACE modifications. Each scenario is used to create a suitability surface, which is in turn used by the AART to determine the best or least impacting corridors. The suitability surface resulting from the base scenario is shown in Figure 4.

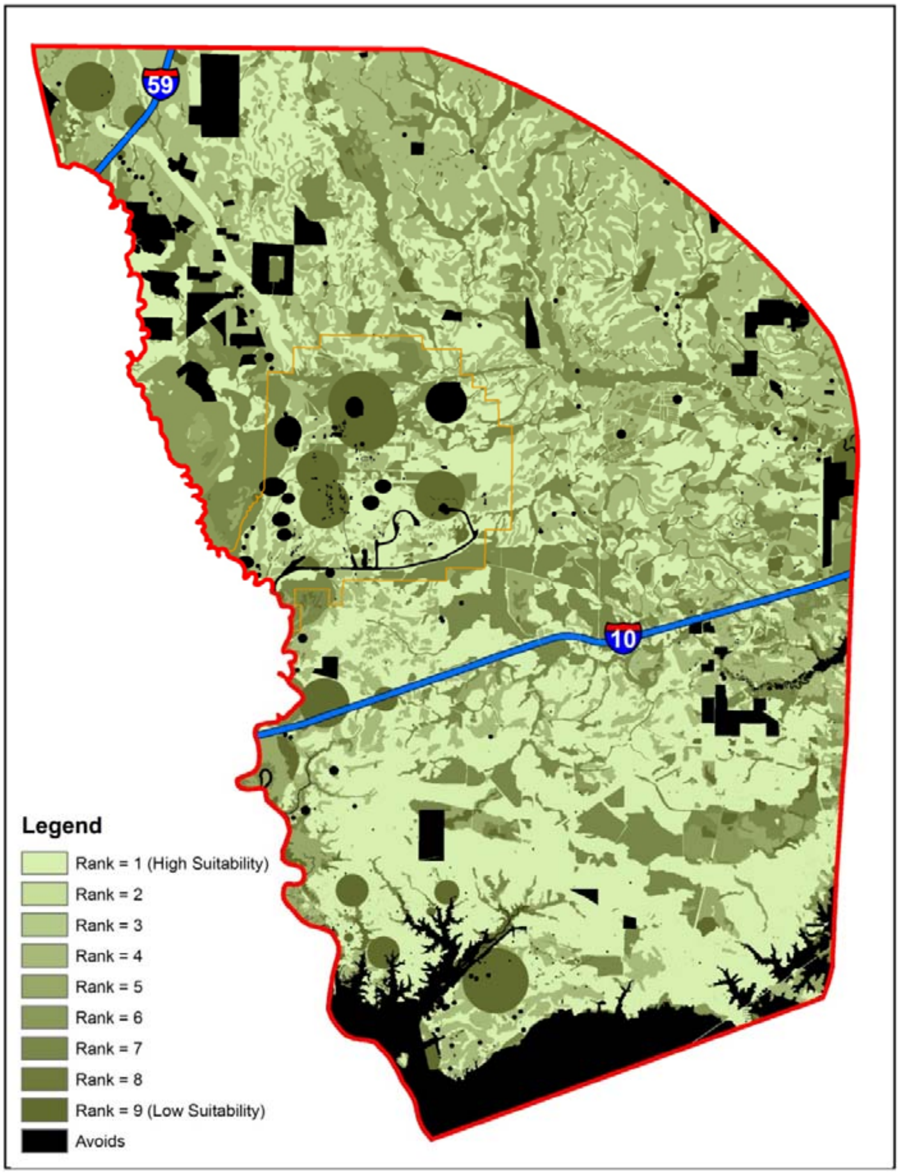


Figure 4 - Base Scenario showing rankings and avoids.

Identification of Layers to Quantify

Once the AART generates a corridor, it quantifies the occurrences of resources, or "impacts," along that corridor (for example, the total acreages of each wetland occurring in a corridor). These corridor impacts are generated for each corridor and used in comparing, evaluating and selecting preferred corridors. Any available GIS layer may be quantified, whether or not it was ranked or used as an Avoid. The layers used in impacts quantifications are listed below.

Point Feature Counts

Layer Description	Layer Name
Archaeological Sites (Stennis)	ArchSites
Archaeological Sites	ArchSites_MDAH
Cemeteries	Cemetery
CERCLA Wells	Cercla_2008
CERCLA Wells (Stennis)	CERCLA_Wells
Churches	Churches
Dams	dams
Detailed Archaeological Sites	DetArchSites
Dept of Health Wells	DoHWells
EPA Regulated Facilities	epa
Historic Properties	HistProps_MDAH
CERCLA Sites	MDEQ_CERCLA
Landfills	MDEQ_Landfills
Protected Water Sources	MDEQ_PWS_Wells
Underground Storage Tanks	MDEQ_UST
Recreational Facilities	mri
National Registry of Historic Places	natreg
NPDES Sites	npdes
Oil and Gas Wells	oilngas
RCRA Sites	rcra
Impoundment Sites	sia
Tanks, Petroleum	Tanks
Toxic Release Inventory Sites	tri
USGS Wells	USGS_Wells09
Underground Storage Tanks	UST_Dec08

Linear Feature Crossings

Layer Description	Layer Name
Hydrography	HydroLine
Major Transmission Lines	majr_transm10
Gas Lines	msgas
Natural Gas Pipelines	NatGasPipelines
Nat'l Hydrography Dataset, Named Streams	nhd_named_streams
Nat'l Hydrography Dataset, Other Flow Lines	nhd_othFL
Power Lines	PowerLines
Rail Lines	rail_lines
Roads	RoadsTIGER
Streams, 303d	Streams_303d
Wastewater Utility Lines	WasteWaterUtility
Water Utility Lines	WaterUtility
Streams	HydroLine

Linear Feature Mileage Calculations

Layer Description	Layer Name
Streams	HydroLine
Nat'l Hydrography Dataset, Named Streams	nhd_named_streams
Nat'l Hydrography Dataset, Other Flow Lines	nhd_othFL
Streams, 303d	treams_303d

Polygon Acreage Calculations

Layer Description	Layer Name
Archaeological Probability (Stennis)	ArchProb
Archaeological Sites (Stennis)	ArchSites_buff
Archaeological Sites	ArchSites_MDAH_buff
Cemeteries	Cemetery_buff
CERCLA Sites (Stennis)	CERCLA_Site_Areas
CERCLA Sites	CERCLA2008_buff
Dams	dams_buff
Dept. of Health Wells	DoHWells_buff
EPA Regulated Facilities	epa_buff
Hazardous Waste Sites	hazardous_waste_sites
Historic Properties	HistPropsMDAH_buff
Landfills (Stennis)	landfill_cells
Water Wells, Primary Protection Areas	MDEQ_PPA
Water Wells, Source Water Prot. Areas	MDEQ_SWPA
Mines	Mines
Recreational Facilities	MRI_buff
National Registry Sites	Natreg_buff
National Hydrography Dataset, Other Areas	nhd_othareas
National Hydrogrpahy Dataset, Water Bodies	nhd_waterb
Land Cover	NLCD_MS_UTM16
Oil and Gas Wells	oilngas_buff
Prime Farmland	PrimeFarmland
RCRA Sites	RCRA_buff
Tanks, Petroleum	Tanks_buff
Toxic Release Inventory Sites	TRI_buff
USGS Wells	USGS_Wells_buff
Underground Storage Tanks	UST_buff
Wetland Mitigation Banks, Existing	wetland_mit_exist
Wetland Mitigation Banks, Proposed	wetland_mit_prop
NWI Wetlands	Wetlands

Identification of Start, End, and Way Points

In order for the AART to identify the conceptual alternatives, it is necessary to provide it with start and end points. These points mark the beginning and ending of the corridors. The AART connects these points by finding the least-impact path through the suitability layer from one point to the other. In order to generate additional alternatives with the same set of criteria, waypoints may be used in between the start and end points to guide corridors through specific areas of interest.

Among the issues considered for potential points are logical "tie-ins" to the existing rail network, potential for economic development, avoidance of sensitive areas, etc. For this study, a total of three start/end points and two waypoints were used, as shown in Figure 5. Points S4 and S5 were chosen along the existing Port Bienville rail line in the southern portion of the study area. The northern endpoint is located near Nicholson, MS at the junction of the existing rail line and Norfolk Southern mainline. In order to investigate additional possibilities two waypoints were used for some of the initial runs. Point W1 was located near Stennis International Airport to explore a possible connection to the airport for potential economic development opportunities. Point W2 was placed at the interchange of I-10 and MS 607 to investigate possibly crossing I-10 at that specific location.

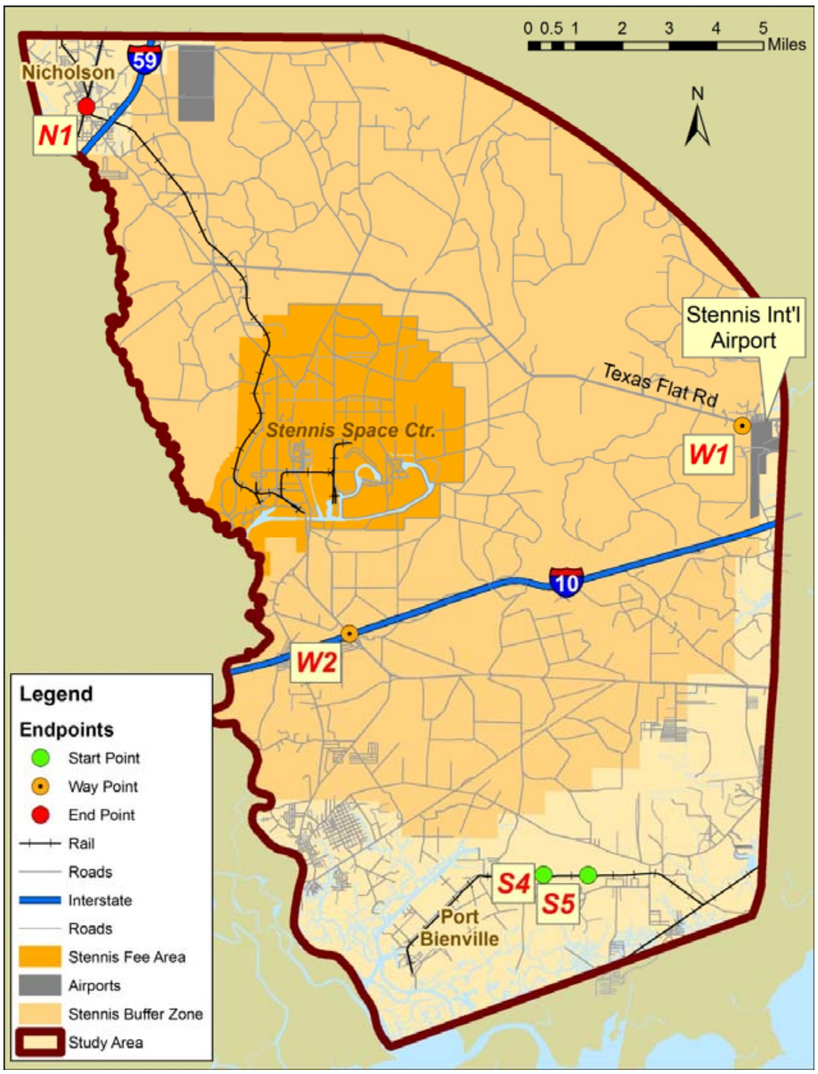


Figure 5 - Start, End, and Way Points.

Corridor Parameters

The AART calculates impacts based on a corridor width which is specified by the user. For this study a corridor width of 1,000 feet was used. In order to meet engineering requirements for minimum rail curvature, a horizontal curve radius of 1,500 feet was used for "smoothing" the corridors.

Generation of Conceptual Alternatives

Once the data were compiled, the rankings determined, and the endpoints chosen, the AART was ready to begin generating conceptual corridors. Various combinations of start, end and waypoints were developed in order to generate a number of corridor alternatives to evaluate. The point combinations that were used are as follows:

- S4 to N1
- S5 to N1
- S4 to W1 to N1
- S5 to W1 to N1
- S4 to W2 to N1
- S5 to W2 to N1

As the conceptual corridors were generated, their locations and impacts were reviewed. In cases where the corridors would veer into unexpected areas, explanations were sought by investigating the data layers and their assigned rankings.

The AART generated an impacts report for each corridor detailing the cultural and environmental impacts for that corridor. The corridor locations and the impacts reports were used by the project Team in the corridor evaluation process, along with factors such as future development and other intangibles. Staff experience and expertise in conducting corridor studies played an important part in the corridor review and evaluation process.

Initial AART Results

Figures 6 through 12 show the various ranking and avoids combinations (scenarios) and the resulting corridors that were generated from the base settings. Due to some preliminary and test scenarios, the scenario numbering begins at "20". Note that after Scenario 23, the waypoint alternatives were deemed unreasonable and were not utilized for subsequent scenarios. This is explained in greater detail in the section titled "Refinement of the Alternative Corridors".

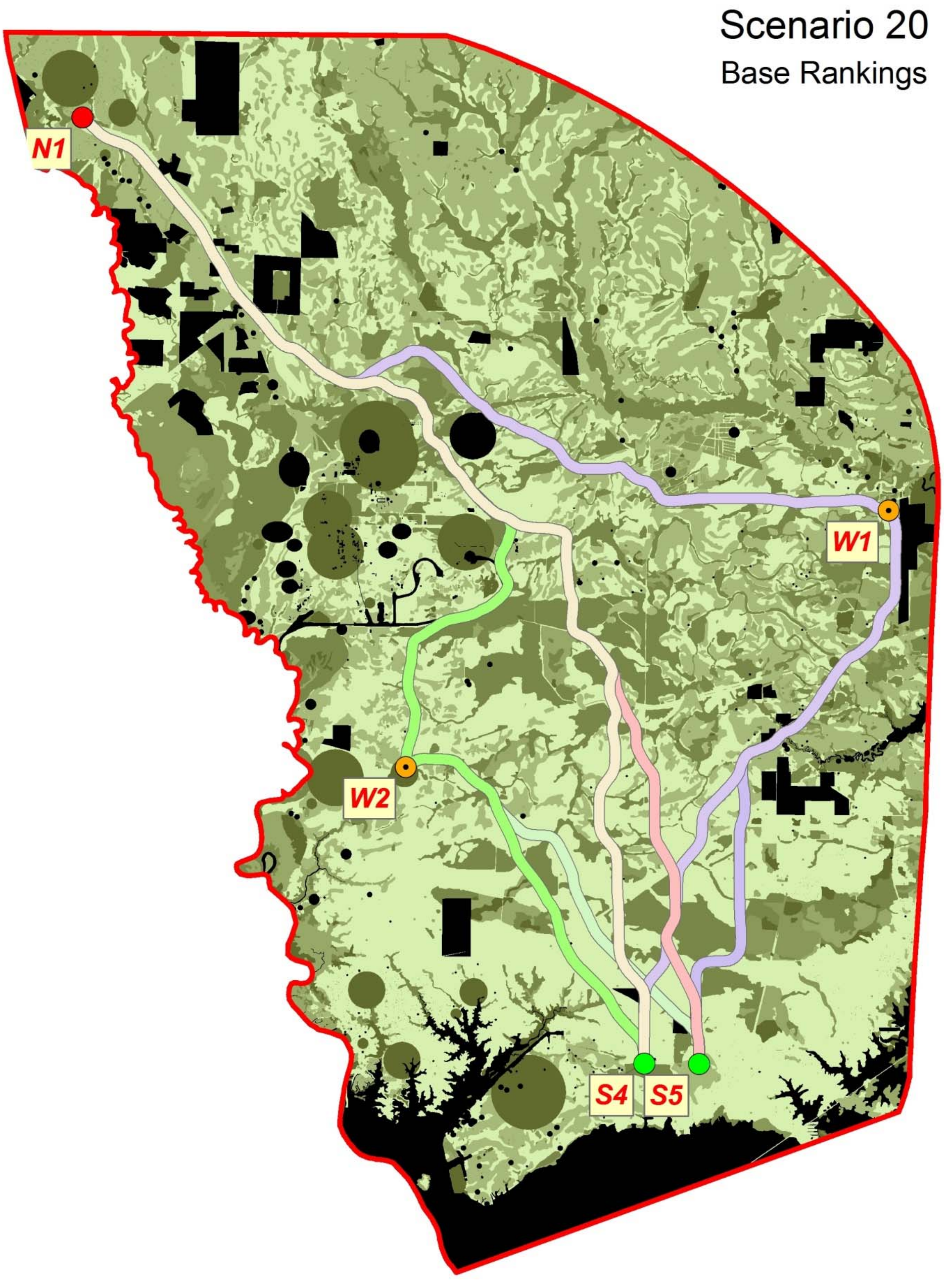


Figure 6 - Scenario 20.

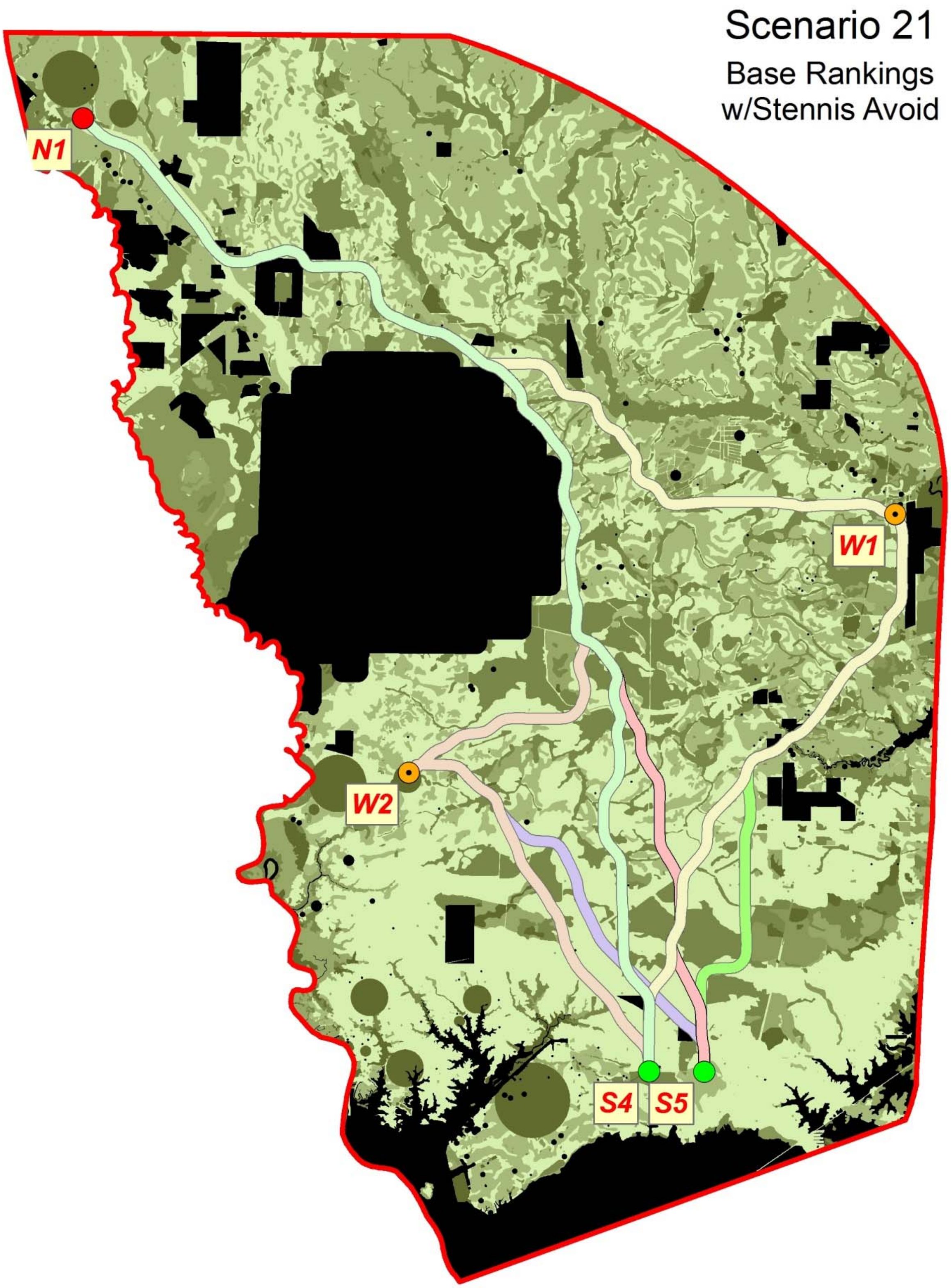


Figure 7 - Scenario 21.

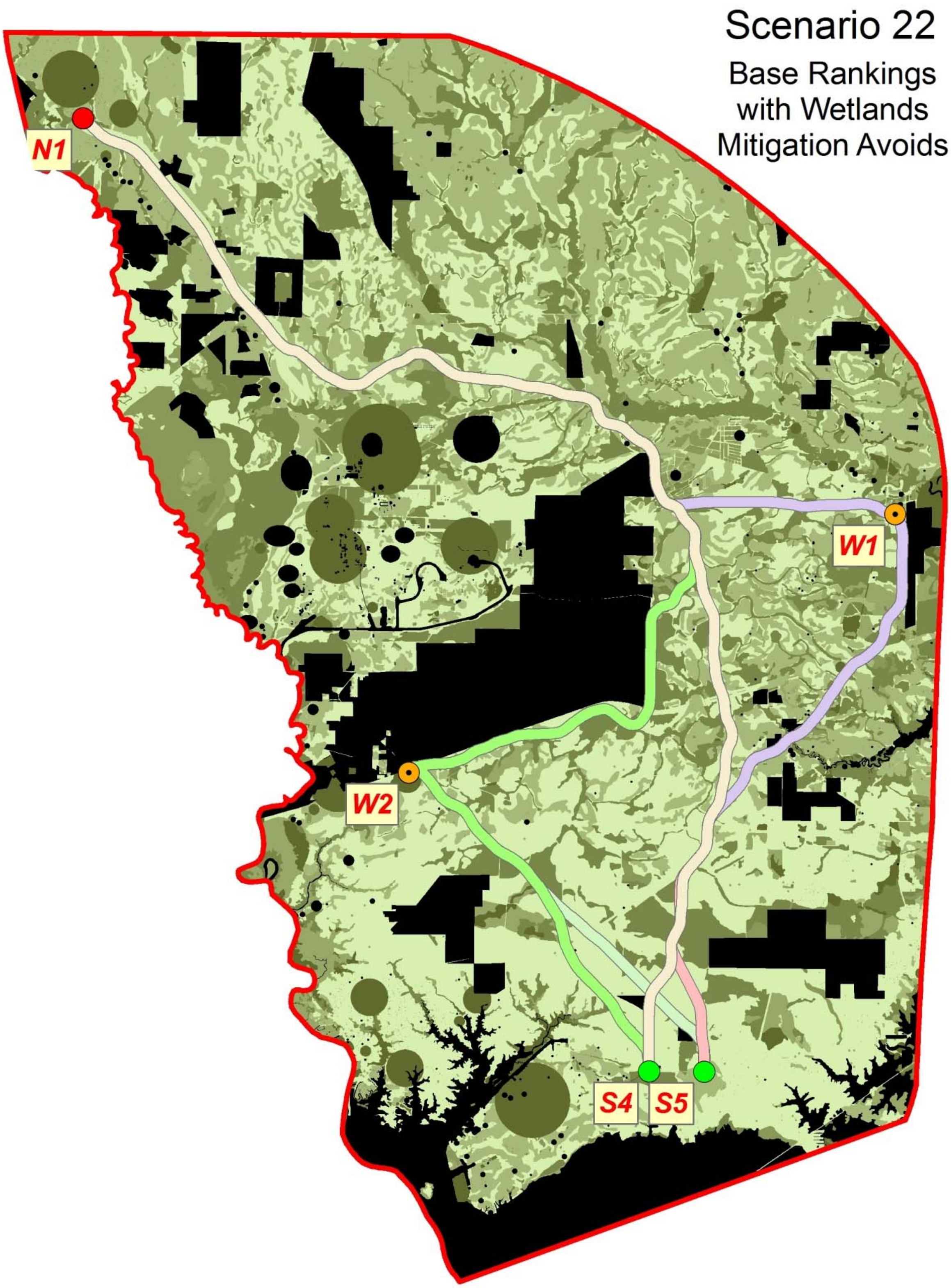


Figure 8 - Scenario 22.

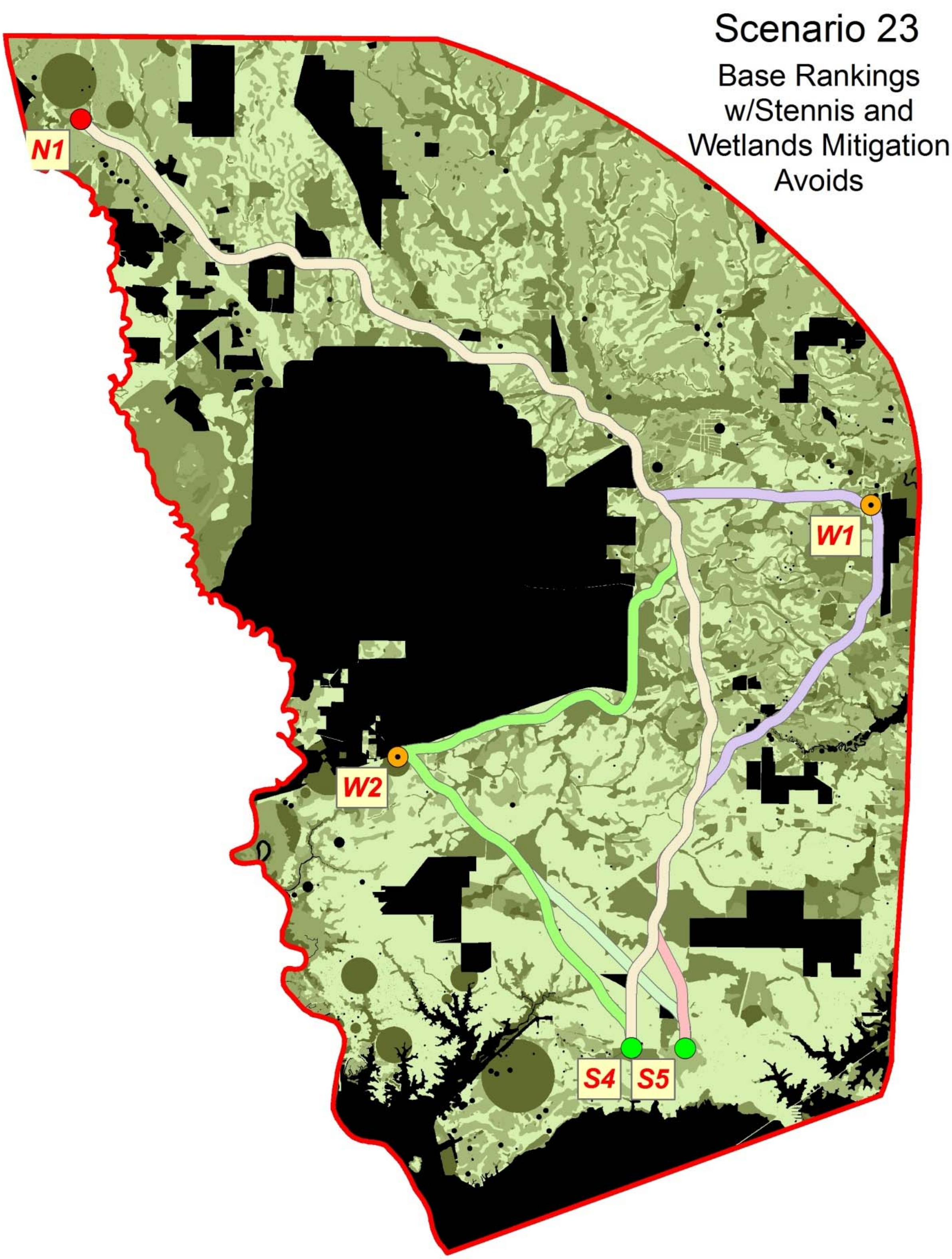


Figure 9 - Scenario 23.

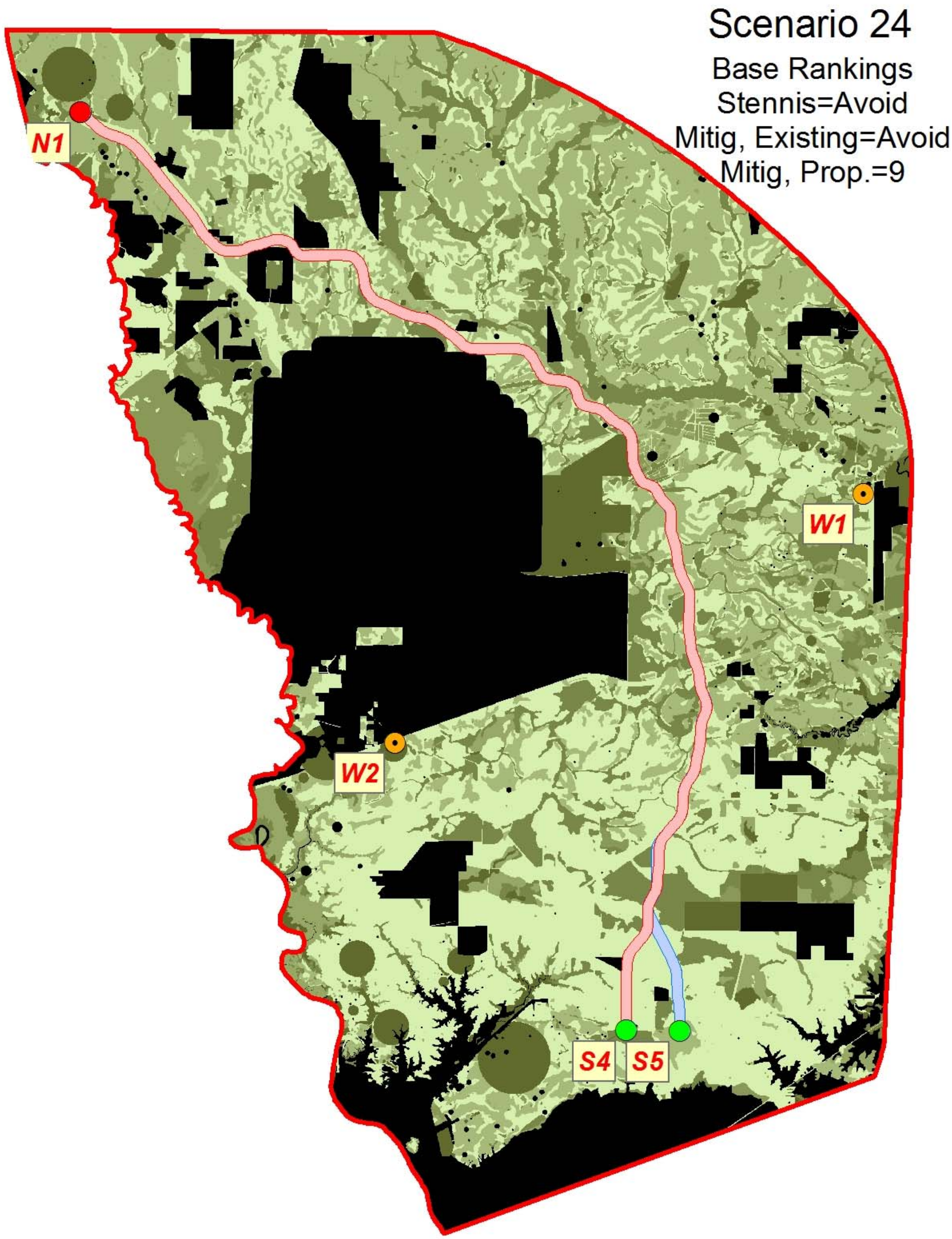


Figure 10 - Scenario 24.

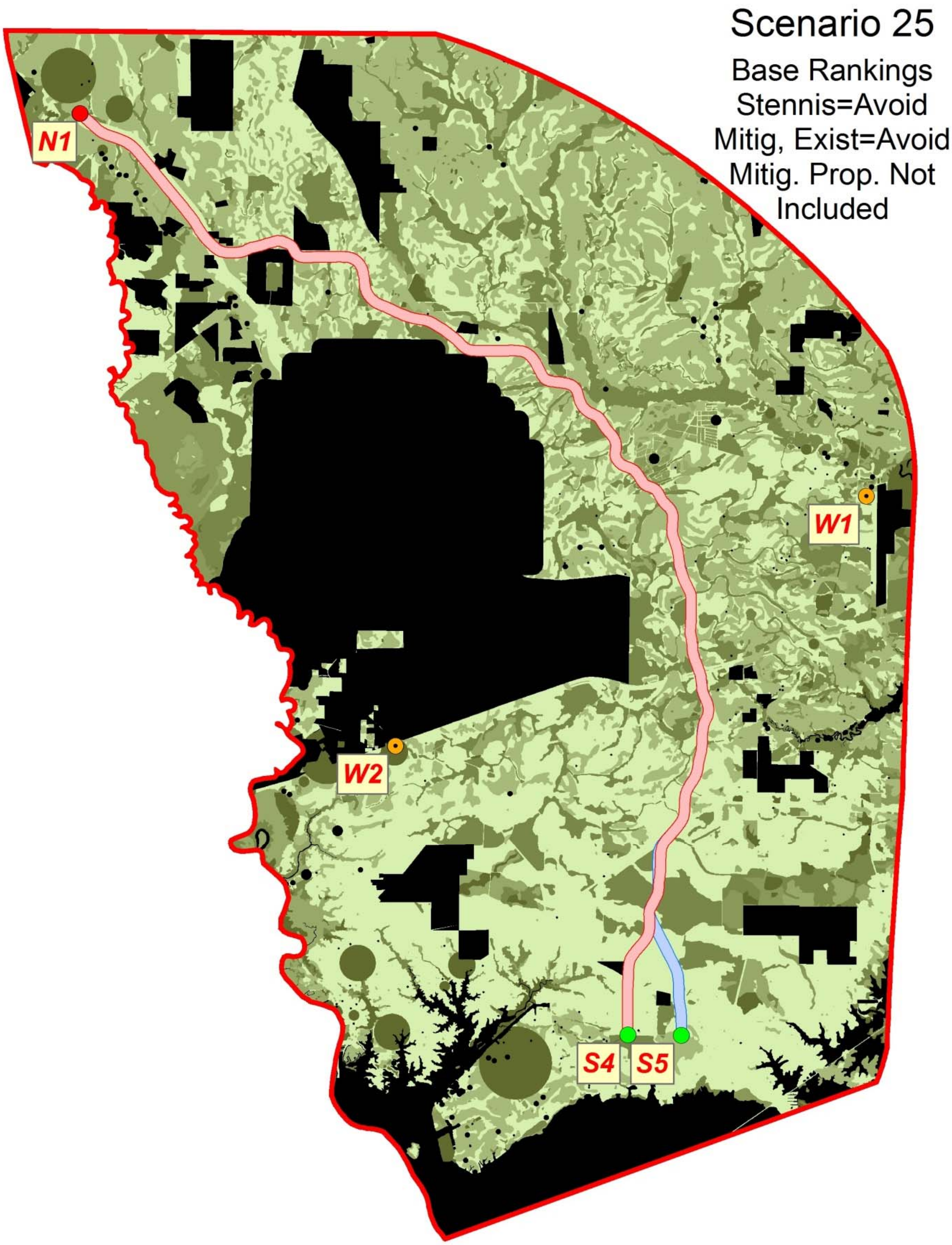


Figure 11 - Scenario 25.

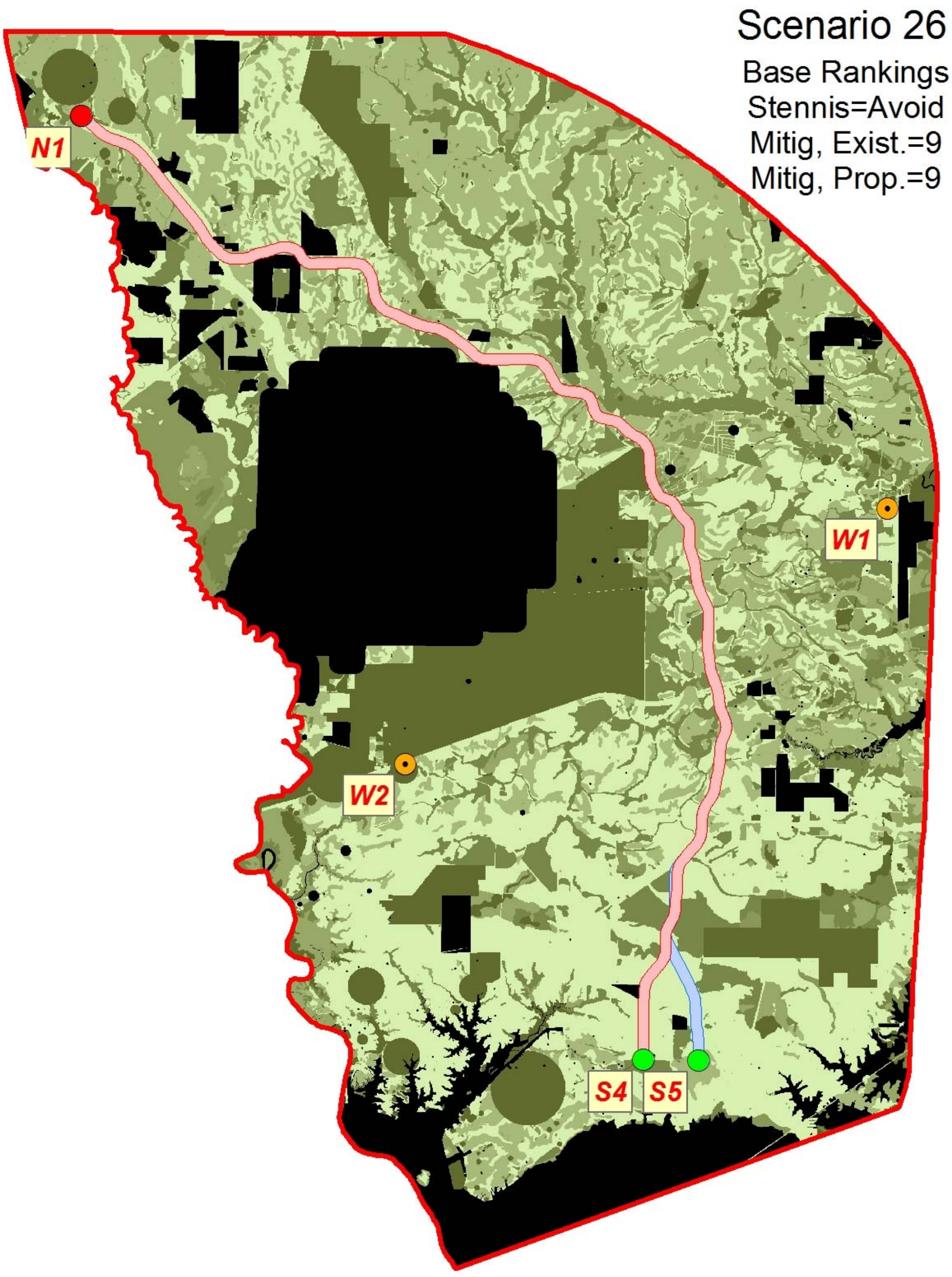


Figure 12 - Scenario 26.

Figures 13 and 14 show the results obtained after incorporating the modifications to the base scenario that were requested by the US Army Corps of Engineers (USACE).

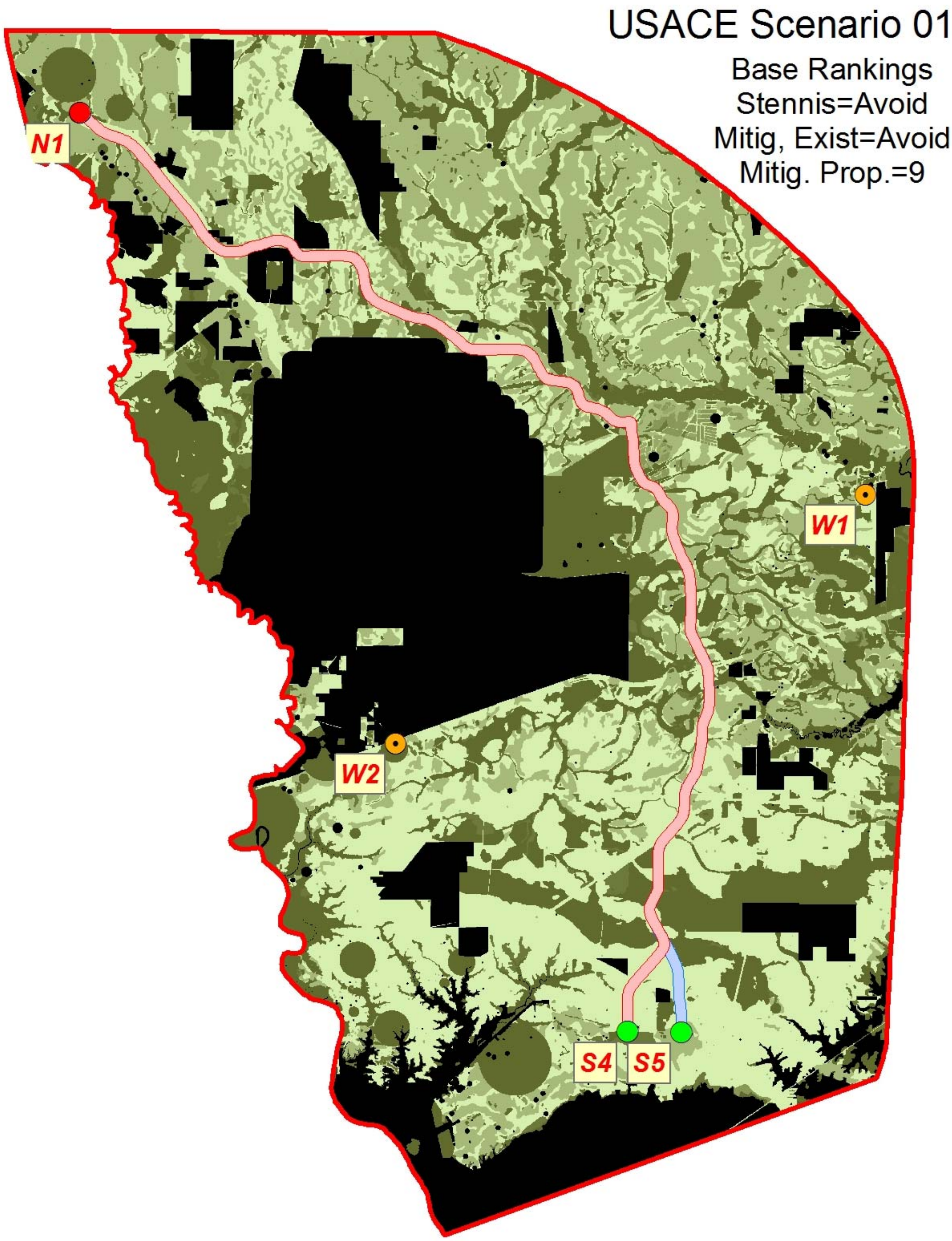


Figure 13 - US Army Corps of Engineers Scenario 1.

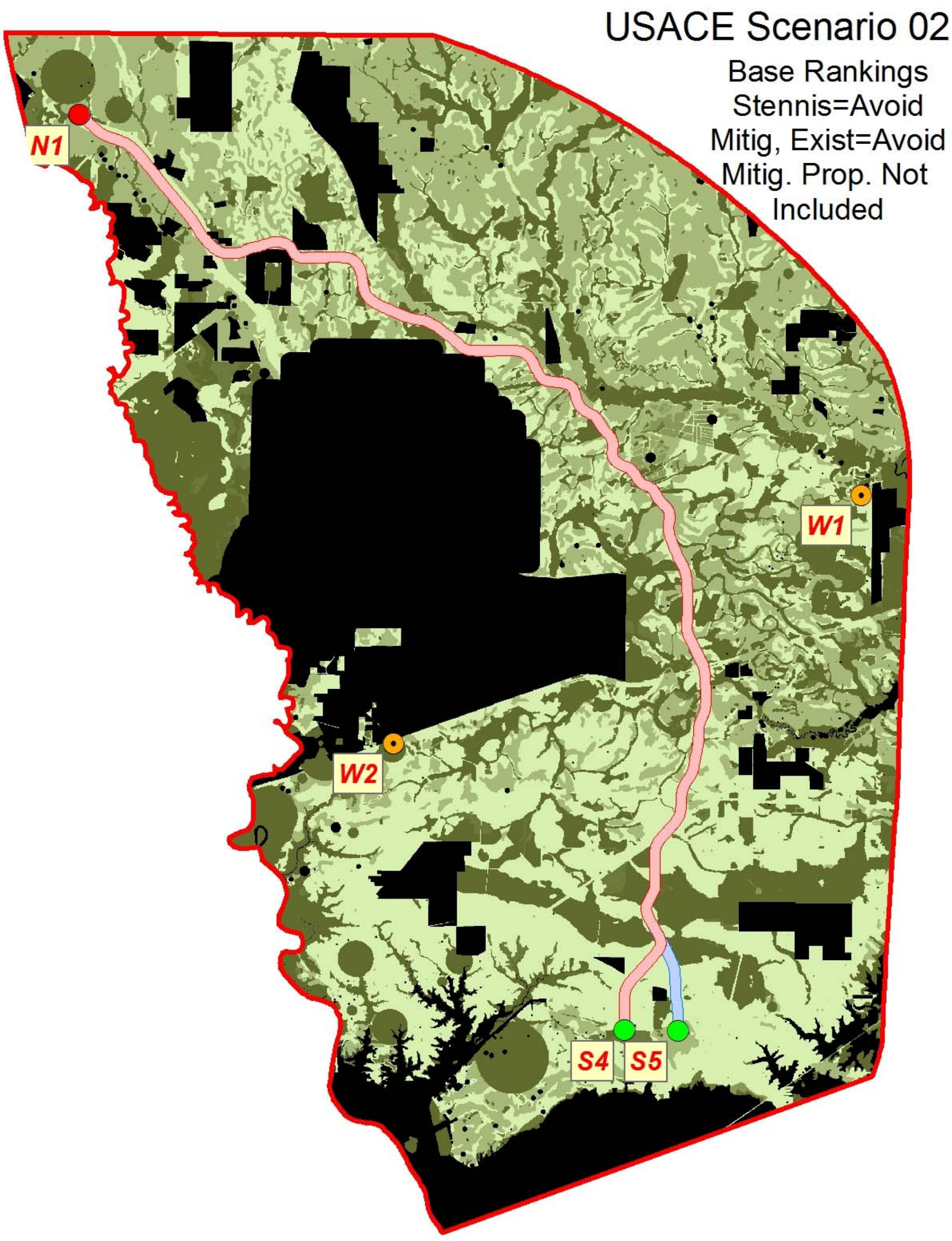


Figure 14 - US Army Corps of Engineers Scenario 2.

Finally, figures 15 - 17 show the results obtained after incorporating the modifications to the base scenario that were requested by the Environmental Protection Agency (EPA).

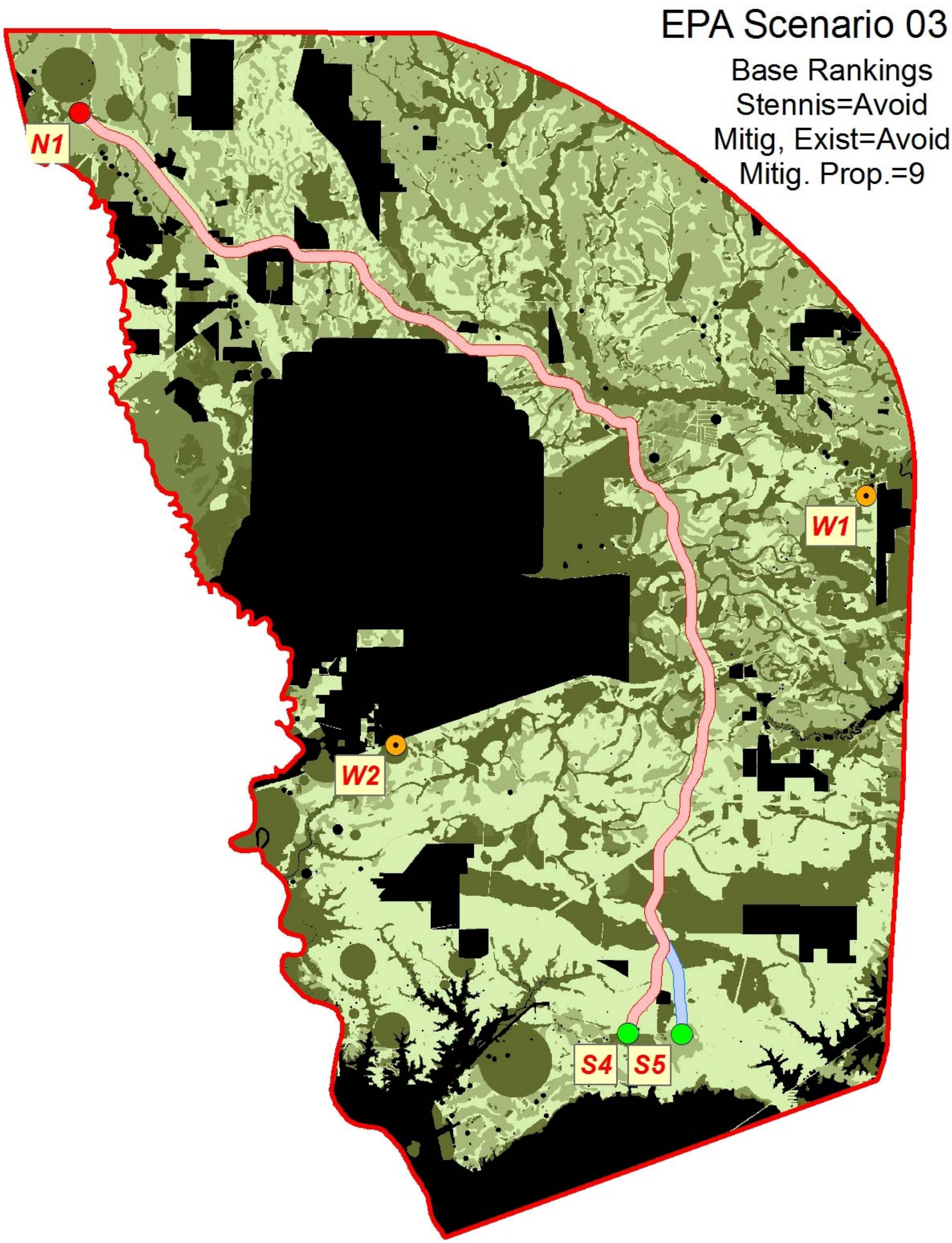


Figure 15 - Environmental Protection Agency Scenario 3

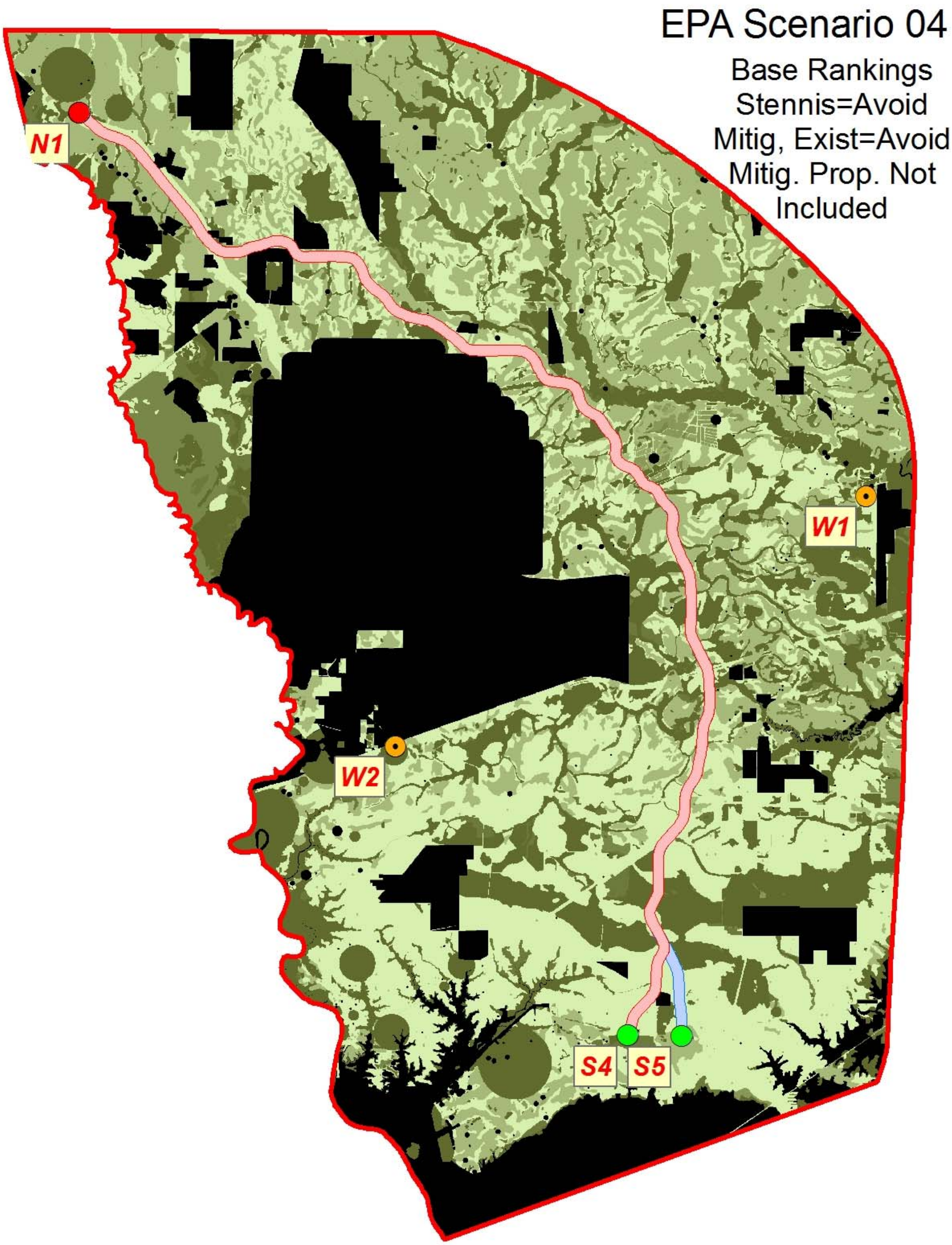


Figure 16 - Environmental Protection Agency Scenario 4.

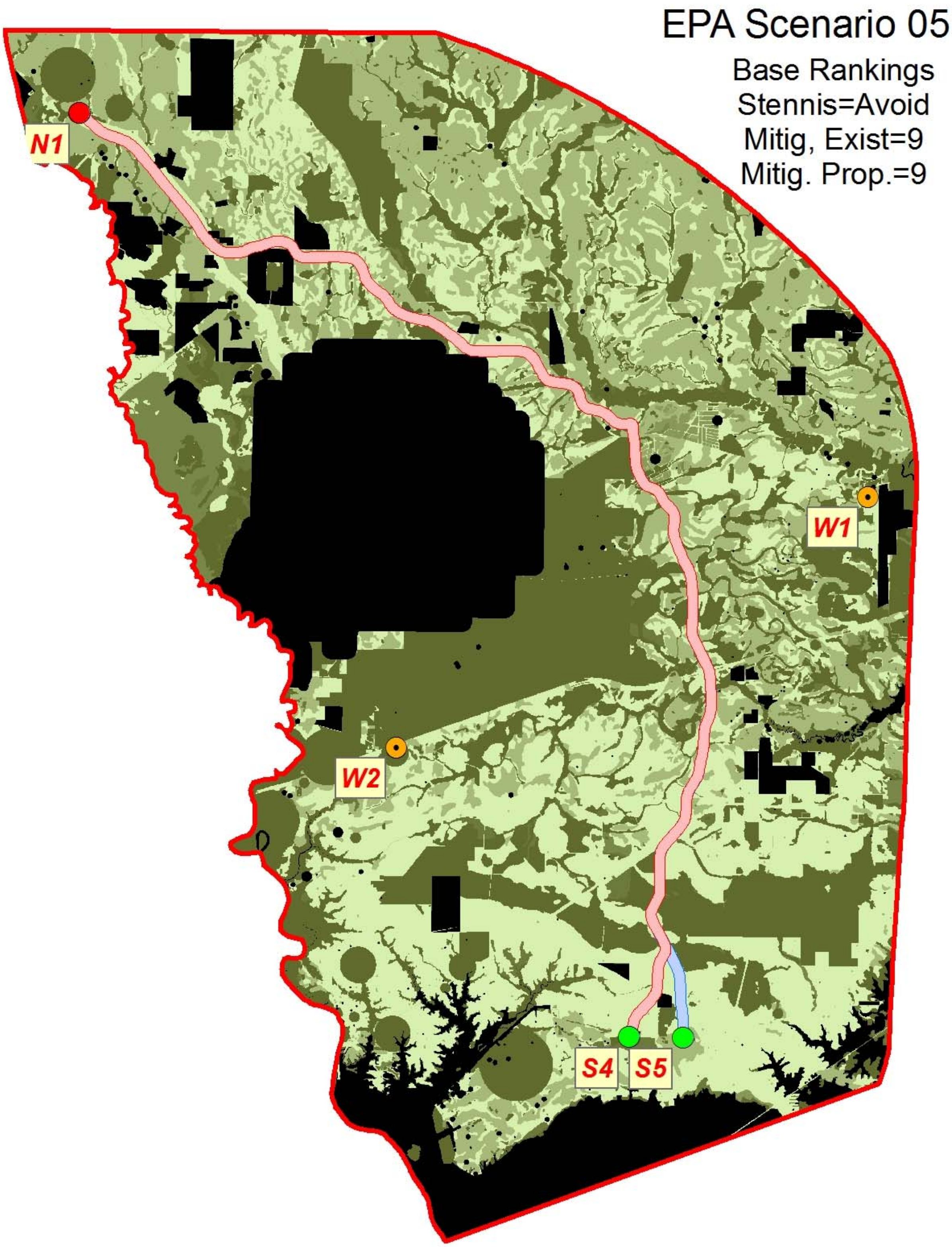


Figure 17 - Environmental Protection Agency Scenario 5.

Refinement of the Alternative Corridors

Once the initial AART developed alternative corridors were identified the refinement process began. Early on, quite a few corridors were eliminated from further study for various reasons. As documented below, Scenarios 20, 21, 22, 23 and 24 were eliminated as a first step in the process towards identification of the Reasonable Alternatives.

Scenario 20

As shown on page 17, Scenario 20 identified 6 possible corridors. These corridors were the initial corridors developed incorporating the base AART criteria. For this scenario restrictions were not placed on the Stennis Fee Area or the existing or proposed wetland mitigation banks within the study area. These alternative corridors were eliminated for the following reasons:

1. Each corridor traversed through the Stennis Fee Area which is a secure area of property, contained by high security fencing and is owned and maintained by the Federal Government. This property is solely dedicated to operations related to NASA's Stennis Space Facility.

2. Two (2) of the alternative corridors severed the wetland mitigation bank known as Devil's Swamp Mitigation Bank. Additionally these corridors also cut through the proposed wetland mitigation bank known as the Texas Flat Mitigation Bank. Extensive impacts to the existing and proposed banks would result from these corridors. (the boundaries of the banks are not shown on the map on page 20 but are shown on other maps beginning with Scenario 22)

3. Four (4) of the alternative corridors utilized waypoints W1 and W2 which were initially identified by the study team as potential strategic locations for the rail corridor. Waypoint 1 was established to consider the economic benefits of the rail line in close proximity to the Stennis International Airport. It was determined that currently there are no strong economic drivers to support diverting the rail line over to the airport. If the need develops in the future a rail spur off the proposed project could be considered. Waypoint 2 was established as a possible I-10 crossing location for the rail line. This interstate crossing location proved to not be a good location. Impacts to the Devil's Swamp Mitigation Bank and required modifications to the I-10/SR 607 interchange were determined to be too extensive.

Scenario 21

As shown on page 18, Scenario 21 identified 6 possible corridors. These corridors incorporated the base AART criteria in addition to restrictions placed on the Stennis Fee Area. No restrictions were placed on the existing or proposed wetland mitigation banks. These alternative corridors were eliminated for the following reasons:

1. Four (4) of the alternative corridors severed the wetland mitigation bank known as Devil's Swamp Mitigation Bank and also impacted the proposed Texas Flat mitigation bank

2. Four (4) of the alternative corridors utilized waypoints W1 and W2. The corridors associated with W1 were considered not economically beneficial. The corridors associated with W2 required extensive modifications to the I-10/SR 607 interchange and paralleled and impacted I-10 for several miles and were determined not feasible.

Scenario 22

As shown on page 19, Scenario 22 identified 6 possible corridors. These corridors incorporated the base AART criteria in addition to restrictions placed on the existing and proposed wetland mitigation banks. No restrictions were placed on the Stennis Fee Area. These alternative corridors were eliminated for the following reasons:

1. Each corridor dipped down into the Stennis Fee Area on the very north boundary of the property.

2. Four (4) of the alternative corridors severed the wetland mitigation bank known as Devil's Swamp Mitigation Bank and also impacted the proposed Texas Flat mitigation bank

3. Four (4) of the alternative corridors utilized waypoints W1 and W2. The corridors associated with W1 were considered not economically beneficial. The corridors associated with W2 required extensive modifications to the I-10/SR 607 interchange and paralleled and impacted I-10 for several miles and were determined not feasible.

Scenario 23

As shown on page 20, Scenario 23 identified 6 possible corridors. These corridors incorporated the base AART criteria in addition to restrictions placed on the Stennis Fee Area and the existing and proposed wetland mitigation banks. These alternative corridors were eliminated for the following reasons:

1. Each corridor crossed Texas Flat Road several times. Texas Flat road is one of the main 2-lane highways in the northern half of the study area that is accessible to the general public. Crossing the road multiple times with the rail alignment would be detrimental to the highways operation.

2. Four (4) of the alternative corridors utilized waypoints W1 and W2. The corridors associated with W1 were considered not economically beneficial. The corridors associated with W2 required extensive modifications to the I-10/SR 607 interchange and paralleled and impacted I-10 for several miles and were determined not feasible. Waypoints W1 and W2 we eliminated from further consideration.

Scenario 24

As shown on page 21, Scenario 24 identified 2 possible corridors. These corridors incorporated the base AART criteria in addition to restrictions placed on the Stennis Fee Area and the existing wetland mitigation bank. The proposed Texas Flat mitigation bank was given a priority ranking value of 9. These alternative corridors were eliminated for the following reason:

1. Both corridors crossed Texas Flat Road several times.

Engineered Alignments

After the initial round of cuts the remaining Alternative Corridors identified in Scenarios 25, 26, USACE01, USACE02 , EPA03, EPA04 and EPA05 were further refined. By using the standard fixed-width corridors and the irregular corridors generated by AART, the study team was able to make slight adjustments to the alignments in order to meet the engineering design criteria for the proposed rail line. The AART also generates irregular corridors which depict the percentage impact variance from the absolute "best fit" line (in other words, the "next-best" corridors). These are areas that, while not as good as the least-impact corridor, are also worth considering. An example of these corridors is shown in Figure 18.

Additionally, Team engineers also identified several new segments for consideration. These new manually-developed segments were derived taking into account the irregular corridors as shown in Figure 18. These new alignments were developed with the intent to maintain minimal impacts to the environment where practical while meeting the design criteria. These engineered alignments were then used to generate new 1,000-foot corridors centered about theses alignments. A new set of corridor impact reports were generated and initial cost estimates for each corridor were prepared. This information was compiled in a matrix format. Impacts were summarized based on the refined 1,000 foot wide corridors. However, the actual impacts for the proposed railroad would be considerably less, probably 90% less, since the final constructed footprint of the rail bed is expected to be typically less than 100 feet in width. Detailed field investigations have not been performed yet and the 1,000 foot wide corridors will allow flexibility to adjust the alignment in the future to further minimize impacts once the detail field work has been completed.

The impacts within these wide corridors and the initial cost estimates for the engineered alignments were used for comparing one alternative to another.

A matrix was developed for comparing the refined corridors to one another. The refined alternative corridors are identified in the matrix by their initial Scenario run and by their respective beginning and end points. The matrix on page 33 includes the impacts for both the original AART generated corridors as well as the manually developed alignments and corridors and the initial cost estimate for the manually developed alignments. The cost estimates provided in the initial matrix do not take into account potential wetland bridging. This initial matrix was developed for comparing the 1,000' wide corridors. Once the corridors were refined and the reasonable alternatives identified a more detailed cost estimate of each was prepared. These refined cost estimates include potential bridging of wetlands and is discussed in more detail in the following section.

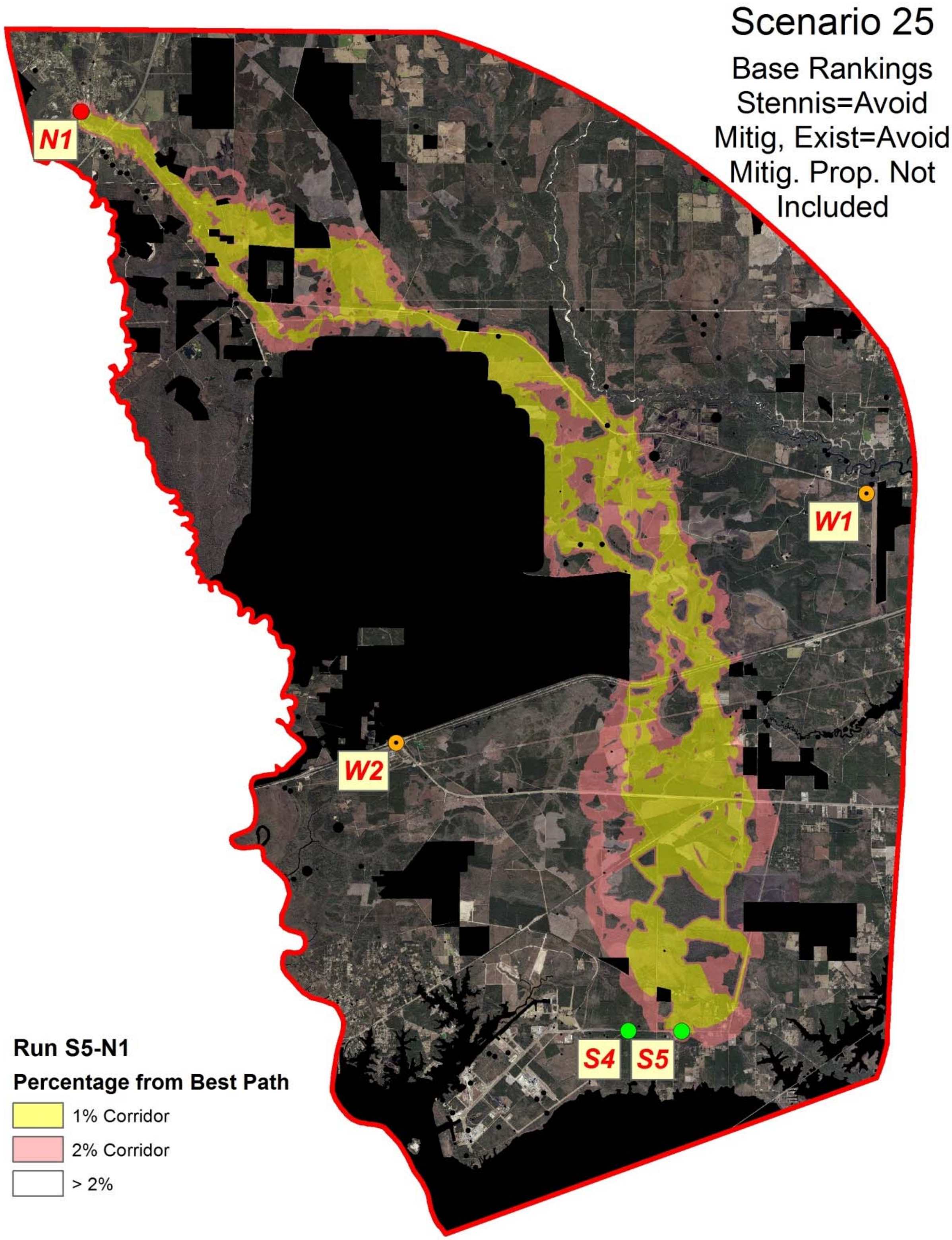


Figure 18 - Other potential corridors for run S5 to N1. These corridors depict "next-best" areas.

ALTERNATIVES MATRIX
PORT BIENVILLE FEASIBILITY STUDY - PORT BIENVILLE TO NICHOLSON

Category	Criterion	Unit	Scenario 25 S4N1	Scenario 25 Manual S4N1	Scenario 25 S5N1	Scenario 25 Manual S5N1	Scenario 26 S4N1	Scenario 26 Manual S4N1	Scenario 26 S5N1	Scenario 26 Manual S5N1	Manual Scenario 27 Manual S4N1	Manual Scenario 27 Manual S5N1
ENGINEERING CRITERIA	Length	Miles	23.69	23.53	23.73	23.62	23.75	23.53	23.78	23.62	23.76	23.85
	Construction Cost	$ Millions		$61.9		$62.1		$61.9		$62.1	$58.7	$58.3
NATURAL FEATURES	Threatened and Endangered Species	Yes (#) / No	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Wetlands	Acreage	435	461	421	436	446	461	432	436	493	467
	Wetland Quality	Value	2,917	3,117	2,846	2,946	2,935	3,117	2,864	2,946	3,319	3,148
	Wetland Mitigation Bank	Acreage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Proposed Wetland Mitigation Bank	Acreage	86	66	86	66	33	66	33	66	66	66
	Stream Crossings	# of Crossings	19	18	18	17	20	18	19	17	16	15
MAN-MADE FEATURES	CERCLA	Acreage	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
	Parks and Wildlife Refuges	Yes (#) / No	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Historical Structures	Yes (#) / No	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Archaeological Sites	Acreage	4.5	4.5	4.5	4.5	0.0	4.5	0.0	4.5	4.5	4.5
	Farmland											
	Prime	Acreage	988	1,039	996	1,062	999	1,039	1,007	1,062	1,081	1,104
	Prime if Drained	Acreage	498	481	492	481	498	481	491	481	565	565
	Statewide Important	Acreage	16	5	16	5	16	5	16	5	8	8
	Relocations	#	0	0	0	0	0	0	0	0	0	0
	Mines	Acreage	48	47	31	42	48	47	31	42	50	44
	Recreational Facilities	Acreage	0	0	0	0	0	0	0	0	0	0
	Native American Tribe Impacts	# (Acreage)	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
INFRASTRUCTURE	Water Wells	Acreage	10.3	10.6	10.2	10.6	10.6	10.6	10.5	10.6	11.2	11.2
	Cemeteries	#	0	0	0	0	0	0	0	0	0	0
	Transmission Line Crossings	#	2	2	2	2	2	2	2	2	2	2
	Gas Line Crossings	#	4	4	4	4	4	4	4	4	4	4

Category	Criterion	Unit	Scenario EPA03 & EPA05 (1) S4N1	Scenario EPA03 & EPA05 (1) Manual S4N1	Scenario EPA03 & EPA05 (1) S5N1	Scenario EPA03 & EPA05 (1) Manual S5N1	Scenario EPA04 S4N1	Scenario EPA04 Manual S4N1	Scenario EPA04 S5N1	Scenario EPA04 Manual S5N1	Scenario USACE01 S4N1	Scenario USACE01 Manual S4N1	Scenario USACE01 S5N1	Scenario USACE01 Manual S5N1	Scenario USACE02 S4N1	Scenario USACE02 Manual S4N1	Scenario USACE02 S5N1	Scenario USACE02 Manual S5N1
ENGINEERING CRITERIA	Length	Miles	23.96	23.69	23.85	23.65	23.78	23.69	23.67	23.65	24.08	23.69	23.93	23.64	23.90	23.69	23.75	23.64
	Construction Cost	$ Millions		$62.2		$62.1		$62.7		$62.5		$61.7		$62.0		$62.1		$62.4
NATURAL FEATURES	Threatened and Endangered Species	Yes (#) / No	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Wetlands	Acreage	426	436	425	428	416	436	416	428	429	435	429	429	420	435	420	429
	Wetland Quality	Value	3,569	2,954	3,570	2,891	3,555	2,954	3,556	2,891	3,603	2,946	3,607	2,900	3,589	2,946	3,593	2,900
	Wetland Mitigation Bank	Acreage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
	Proposed Wetland Mitigation Bank	Acreage	33	66	33	66	86	66	86	66	33	66	33	66	86	66	86	66
	Stream Crossings	# of Crossings	19	18	18	17	18	18	17	17	19	18	18	17	18	18	17	17
MAN-MADE FEATURES	CERCLA	Acreage	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
	Parks and Wildlife Refuges	Yes (#) / No	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Historical Structures	Yes (#) / No	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Archaeological Sites	Acreage	0.0	4.5	0.0	4.5	4.5	4.5	4.5	4.5	0.0	4.5	0.0	4.5	4.5	4.5	4.5	4.5
	Farmland																	
	Prime	Acreage	1,037	1,057	1,043	1,077	1,017	1,057	1,023	1,077	1,037	1,054	1,045	1,077	1,017	1,054	1,025	1,077
	Prime if Drained	Acreage	478	488	460	469	478	488	460	469	502	490	476	466	502	490	476	466
	Statewide Important	Acreage	18	8	18	8	18	8	18	8	18	8	18	8	18	8	18	8
	Relocations	#	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mines	Acreage	34	44	31	42	34	44	31	42	31	42	31	42	31	42	31	42
	Recreational Facilities	Acreage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Native American Tribe Impacts	# (Acreage)	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
INFRASTRUCTURE	Water Wells	Acreage	10.5	10.8	10.5	10.6	10.3	10.8	10.3	10.6	10.5	10.6	10.5	10.6	10.3	10.6	10.3	10.6
	Cemeteries	#	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Transmission Line Crossings	#	3	2	3	2	3	2	3	2	2	2	2	2	2	2	2	2
	Gas Line Crossings	#	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

INA - Information Not Available at this time
(1) Scenarios EPA03 and EPA05 produced the same results

Reasonable Alternatives

Once the corridor Matrix was completed and the comparison performed several corridors centrally located within the study area emerged as the least costly and least impacting. Every one of these "Reasonable Alternatives" shared a common central corridor. However, two distinct corridors on the north end of the project were identified and several corridors on the southern end were identified. To further define the "Reasonable Alternatives" the study team divided the advanced corridors into segments as identified in Figure 19 on page 35. These 17 segments represent a possible combination of 40 potential corridors. Following the development of the segments, the study team re-quantified impacts and cost by segment. Additionally, the costs estimates were further refined by taking into account anticipated bridging of high value wetlands and stream mitigation. These costs estimates are considered all inclusive and represent potential "implementation costs" which includes final design, right-of-way acquisition, construction and inspection services. The estimates are based on the true engineered alignments within each refined corridor and are representative of 2013 unit cost data derived from other rail projects and from cost experience on other similar projects. At this stage in the project development the alignments are considered conceptual, therefore 20% contingencies have been included in the cost estimates. Following Figure 19 is the Segment Matrix for the Reasonable Alternatives.

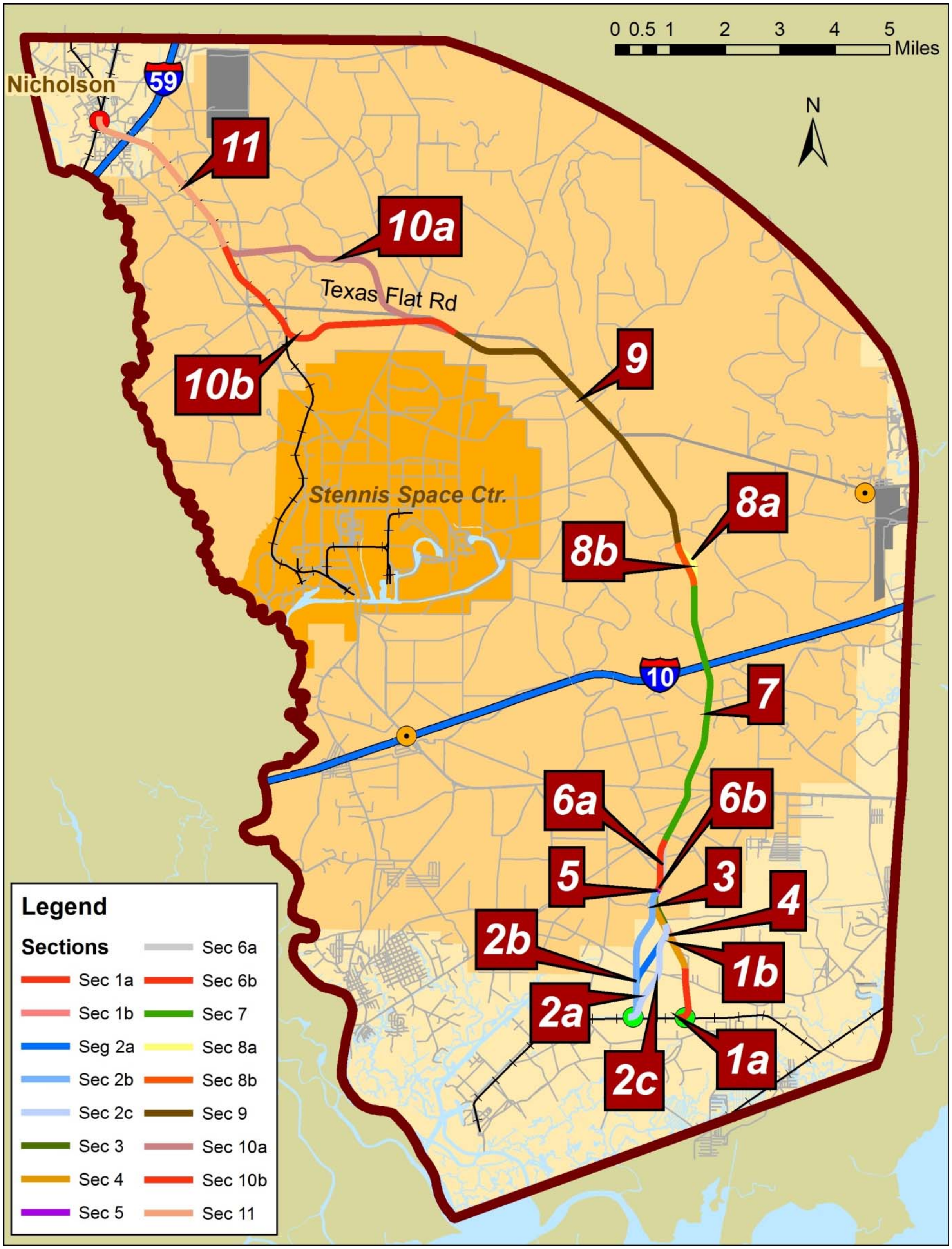


Figure 19 – Engineered alignments and section numbers

SEGMENT MATRIX FOR THE REASONABLE ALTERMATIVES
PORT BIENVILLE FEASIBILITY STUDY - PORT BIENVILLE TO NICHOLSON

CATEGORY	Unit of Measure	Segment 1a	Segment 1b	Segment 2a	Segment 2b	Segment 2c	Segment 3	Segment 4	Segment 5	Segment 6a	Segment 6b	Segment 7	Segment 8a	Segment 8b	Segment 9	Segment 10a	Segment 10b	Segment 11
ENGINEERING CRITERIA																		
Length	Miles	1.02	0.89	1.95	2.47	1.95	0.64	1.54	0.05	0.92	0.92	4.84	0.88	0.83	5.99	4.95	5.18	3.46
Total Estimated Implementation Cost	$ Millions	2.10	1.60	3.80	9.20	3.90	5.50	7.10	2.90	7.90	2.10	20.10	1.60	1.50	26.30	24.60	23.60	5.70
NATURAL FEATURES																		
Wetland Impacts	Acreage	5	0	8	39	9	12	13	6	55	57	68	3	8	157	67	98	55
Wetland Quality	Value	33	0	56	262	64	82	90	44	387	398	457	18	55	1,057	455	658	357
Cost of Impacts to Wetlands	$60K per acre @ 10%	$12,600	$9,600	$22,800	$55,200	$23,400	$33,000	$42,600	$17,400	$47,400	$12,600	$120,600	$9,600	$9,000	$157,800	$147,600	$141,600	$34,200
Devil's Swamp Mitigation Bank	Acreage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proposed Texas Flat Mitigation Bank	Acreage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.52	0.00	0.00	0.00
Cost of Impacts to Mitigation Banks	$120K per acre @ 10%	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$786,240	$0	$0	$0
Length of Wetland Bridging	LF	0	0	0	430		430	430	283	587		596	0	0	1174	1469	1482	0
Stream Crossings	# of Crossings	3	2	7	5	5	1	3	0	0	0	10	0	0	11	10	6	5
HydroLine-Connector	Miles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.05
HydroLine- Ditch	Miles	0.90	0.71	0.87	0.66	1.00	0.09	0.72	0.00	0.00	0.00	1.95	0.00	0.00	2.06	2.05	2.07	2.35
HydroLine- Stream	Miles	0.00	0.00	0.40	0.40	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.32	0.45	0.91
Stream/River - named	Miles	0.00	0.00	0.33	0.20	0.16	0.00	0.00	0.00	0.00	0.00	0.38	0.00	0.00	0.64	0.19	0.22	0.82
Stream/River - other	Miles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	1.81	1.60	0.84	0.07
Streams 303(d)	#	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.00	0.00	0.19	0.22	0.00
Artificial Path	Miles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00
Total Stream Impacts	Miles	0.90	0.71	1.60	1.26	1.27	0.09	0.72	0.00	0.00	0.00	2.64	0.00	0.00	5.22	4.16	3.58	4.19
Total Stream Impacts	Feet	4,752	3,744	8,437	6,653	6,706	465	3,802	0	0	0	13,929	0	0	27,565	21,938	18,881	22,128
Cost of Impacts to Streams	$200 per linear feet @ 10%	$95,040	$74,870	$168,749	$133,056	$134,112	$9,293	$76,032	$0	$0	$0	$278,573	$0	$0	$551,295	$438,768	$377,626	$442,570
MAN-MADE FEATURES																		
CERCLA	Acreage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.44
Archaeological Sites	Acreage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.51	0.00	0.00	0.00
Farmland (Prime)	Acreage	14.58	0.00	0.00	0.00	2.72	0.00	0.00	0.00	0.00	0.00	129.02	35.83	20.72	296.40	233.08	275.18	350.92
Farmland (Prime if Drained)	Acreage	0.00	42.04	63.42	94.70	60.81	49.23	94.93	0.04	64.04	61.63	73.38	34.97	45.60	81.86	123.29	207.70	3.31
Farmland (Statewide Importance0	Acreage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.92	1.99	0.00	0.00	2.72	0.00
Mines	Acreage	0.00	0.00	0.00	5.78	2.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.24	36.26	28.50	4.22
Recreational Facilities	Acreage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INFRASTRUCTURE																		
Water Wells	Acreage	0.00	0.00	0.00	0.67	0.20	1.02	0.67	0.78	0.72	0.72	3.61	0.00	0.00	0.00	0.72	1.28	4.10
Transmission Line Crossings	#	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas Line Crossings	#	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00	0.00	0.00

APPENDIX A
GLOSSARY OF TERMS

CDM Smith

AART (Alternatives Analysis Research Tool) – A CDM Smith proprietary, automated GIS-based tool that identifies and quantifies the corridor and/or alignments with the least amount of impacts.

Alignment - The horizontal and vertical route or direction of a transportation railway or highway.

Avoids – Constraint or buffered areas that are to be bypassed or avoided by the AART.

Buffer - Is an area or zone around a point, line, or polygon that creates an extension that would provide protection or inclusion while using the AART.

Coordinate System - A reference framework consisting of a set of points, lines, and/or surfaces, and a set of rules, used to define the positions of points in space in either two or three dimensions. The Cartesian coordinate system and the geographic coordinate system used on the earth's surface are common examples of coordinate systems.[1]

Corridor - Is a pathway consisting of a long wide strip of land that would be studied for a planned transportations facility such as a railway. The corridor defines a study area that would be furthered studied to develop a reasonable number of alternative alignments.

Geodata - Information in a geographic format that can be used by various computer programs and applications for planning and environmental analysis.

Geodatabase - A database used for storing, querying, and manipulating geodata.

Grid - The division of a map into smaller uniform squares (or cells) providing a horizontal and vertical system used to located fixed positions within a geographical area. The number of squares can be changed to accommodate the size of a geographical area.

Qualitative – An analysis of information that cannot be quantified by numbers.

Quantitative – A numerically-based analysis of data by size or amount.

Raster - Is a format used as a GIS data model and is made up of a grid/cells system. Each cell contains a single value.

Shapefile - A GIS file format that contains a set of points, lines, and/or polygons that provide attributes and geographical information. This file format can also be linked to tabular data and is used by GIS software for mapping and analysis.

Spatial Analysis - The process of studying and comparing spatial data, their attributes and locations and how they interrelate.

Spatial Data - Data that includes points, lines, polygons, and pixels that define a certain specific geographical location that define specific location.

Waypoints – are additional beginning and end points that can be placed in order to allow the user to assist and guide the AART to a specific location or reference point.

---

[1] ESRI. GIS Dictionary. 11 April 2006
<http://support.esri.com/index.cfm?fa=knowledgebase.gisDictionary.gateway>

Port Bienville Rail Alternatives Development
Technical Methodology Report

APPENDIX B
THE ALIGNMENT ALTERNATIVES RESEARCH TOOL (AART)

CDM Smith

The Alignment Alternatives Research Tool (AART) has been proven effective in helping to streamline the NEPA process by providing planners and engineers with critical information from a standardized, inclusive, and defensible process with a turnaround time not possible when using conventional methods. This cost-effective tool processes large amounts of data quickly and results in corridors best suited to project and stakeholder specifications. Since the AART allows users to interactively weight geographic features and attributes, they can be assured that corridors are developed with minimized impacts on the natural and human environment.

The AART is a desktop application consisting of a series of GIS-based functions designed to route conceptual corridor "footprints" among the identified community and environmental resources available from both public databases and project derived databases (see Figure B-1). These "footprints" are developed through a simple "opportunities and constraints" approach. In this approach values are assigned to site-specific resources by experts in the field. The computer model routes preferred paths between user-selected endpoints through an artificial "terrain" created by the weighting of natural resources, socioeconomic, infrastructure and other values that have been assigned in the study area. Additionally, "avoid" areas can be included to effectively 'mask out' any areas where development should not be considered. The system uses a grid- (or cell-) based format for improved model efficiency. The resolution or grid cell size may be further refined as viable corridor alternatives are identified and higher resolution field data is incorporated into the system. The AART will find the least-cost (least impact) path between endpoints and summarize the impacts for each corridor selection. Additionally, AART will also display potential alternative corridor regions for each model run.

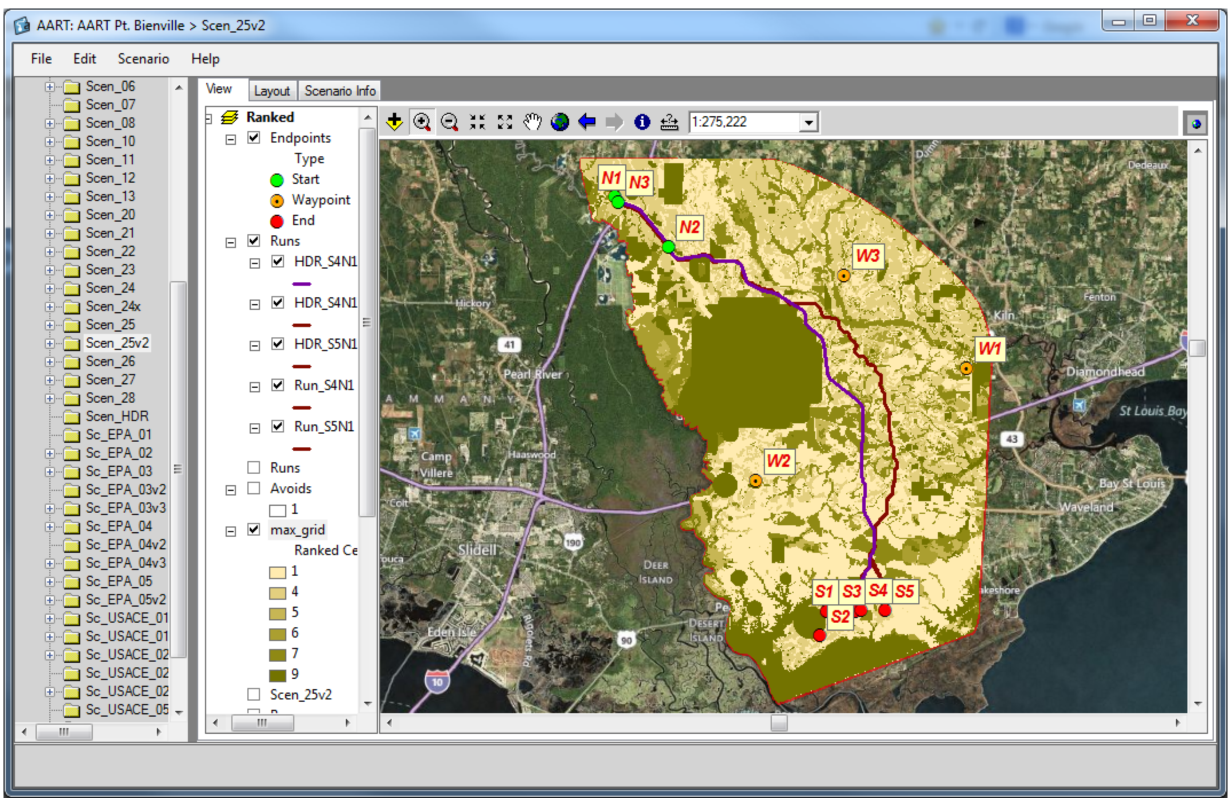


Figure B-1 - AART main interface.

The tool incorporates the functions of ArcGIS, ArcGIS Spatial Analyst, and geodatabases to maintain information and perform the complex spatial calculations needed to effectively analyze each model run.

How AART Works

AART is used to identify potential corridors based on user-provided points and user-ranked GIS data layers. The Tool finds a least-impact path between the points by attempting to stay away from high-ranked areas while maintaining as short a path as possible between points. The desired corridor width is applied and the environmental and cultural impacts of the corridor are calculated.

Endpoints - In order to generate corridors, AART requires at least two endpoints indicating the start and end of the corridor. These points are supplied by the user and are based on project requirements.

Input Data - AART will accept nearly any type of GIS vector data as inputs. Some examples of the types of data that are commonly used are shown in Figure B-2. A special data layer outlining the project study area is also required. All analyses conducted by the Tool will be constrained by the boundaries of this study area.

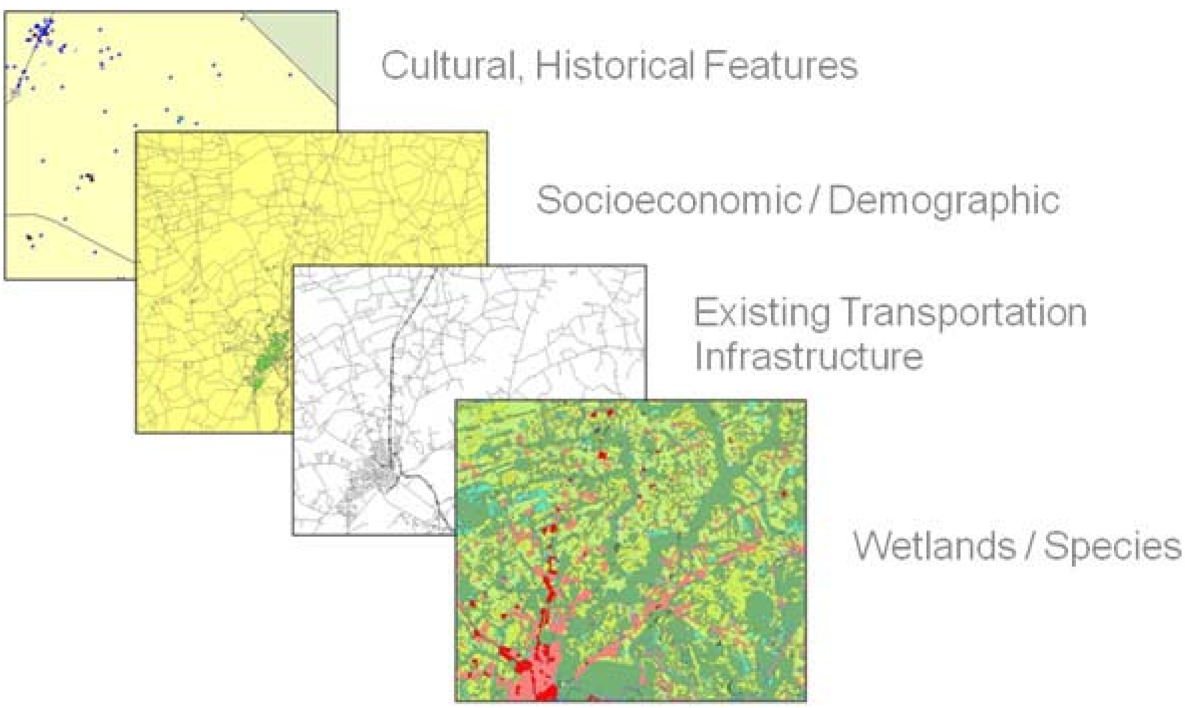


Figure B-2 - Examples of GIS data layers

When the AART is run, the input vector data layers are converted to raster layers using a user-specified cell size (Figures B-3a and B-3b).

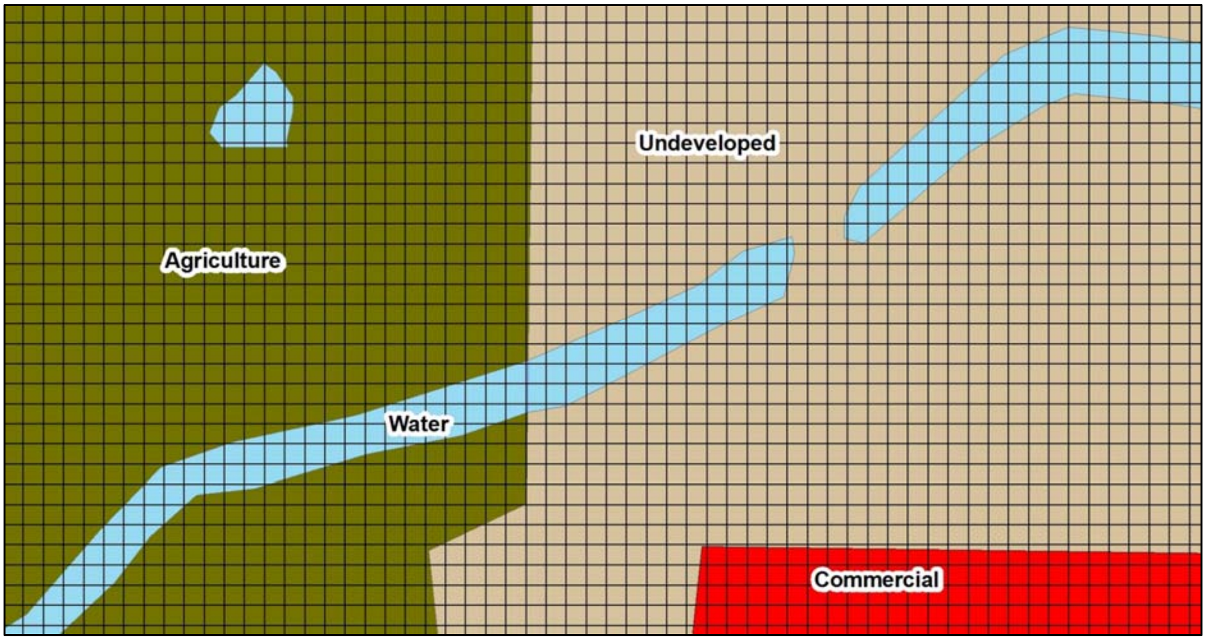


Figure B-3a - GIS data with grid cell overlay.

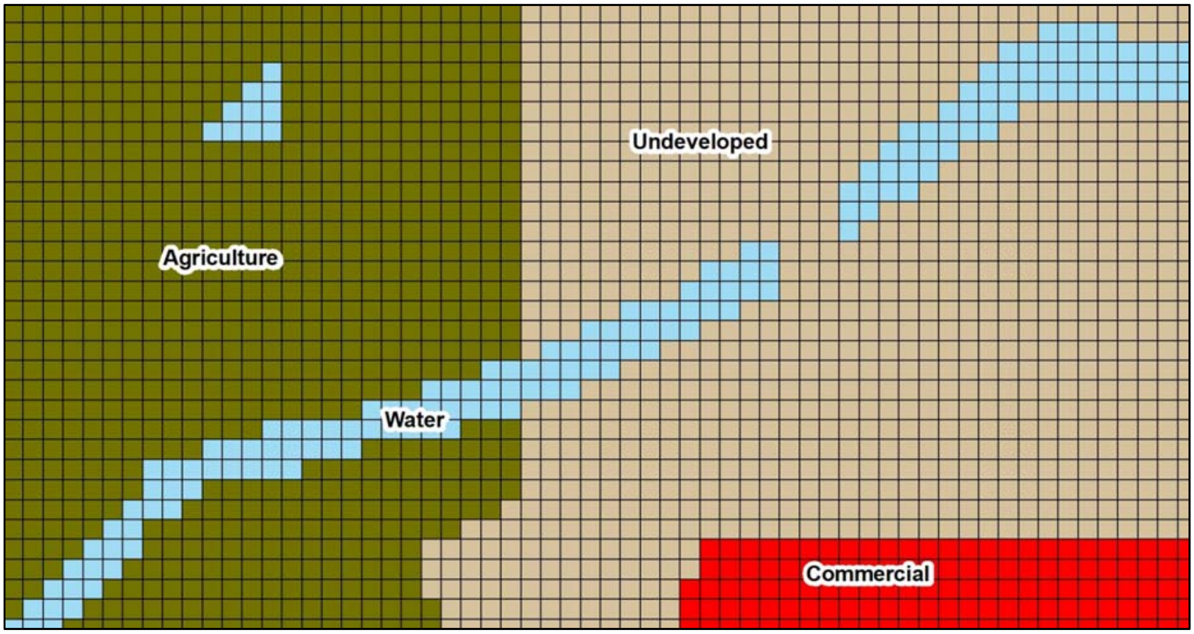


Figure B-3b - GIS data after conversion to raster (cell) data.

Ranking - The GIS layers typically contain various features. For example, a wetlands layer contains polygons for the various types of wetlands. In order for AART to generate least-impact paths, these features must be ranked according to their suitability for locating an alignment. This ranking is based on a scale of 1-9, where low values indicate high suitability and high values indicate low suitability. In addition, there is a designation of “Avoid”, which indicates features that are completely “off limits”. Examples are shown in the table below.

Category	Layer	Ranking
Land Cover		
	Freshwater Marshes	9
	Bottomland Hardwoods	9
	Pasture Land	2
Cultural Features		
	Hospitals	9
	Cemeteries	Avoid
	Schools	9

Input Parameters - The user may specify values for horizontal alignment curvature, corridor width, and layers to be evaluated for impacts.

Data Processing – Once the layer features have been ranked, the AART creates a single "suitability" layer. This layer is created by selecting the highest ranking for each corresponding cell in each layer. Figure B-4a depicts this process while Figure B-4b shows an example of a real-world suitability layer.

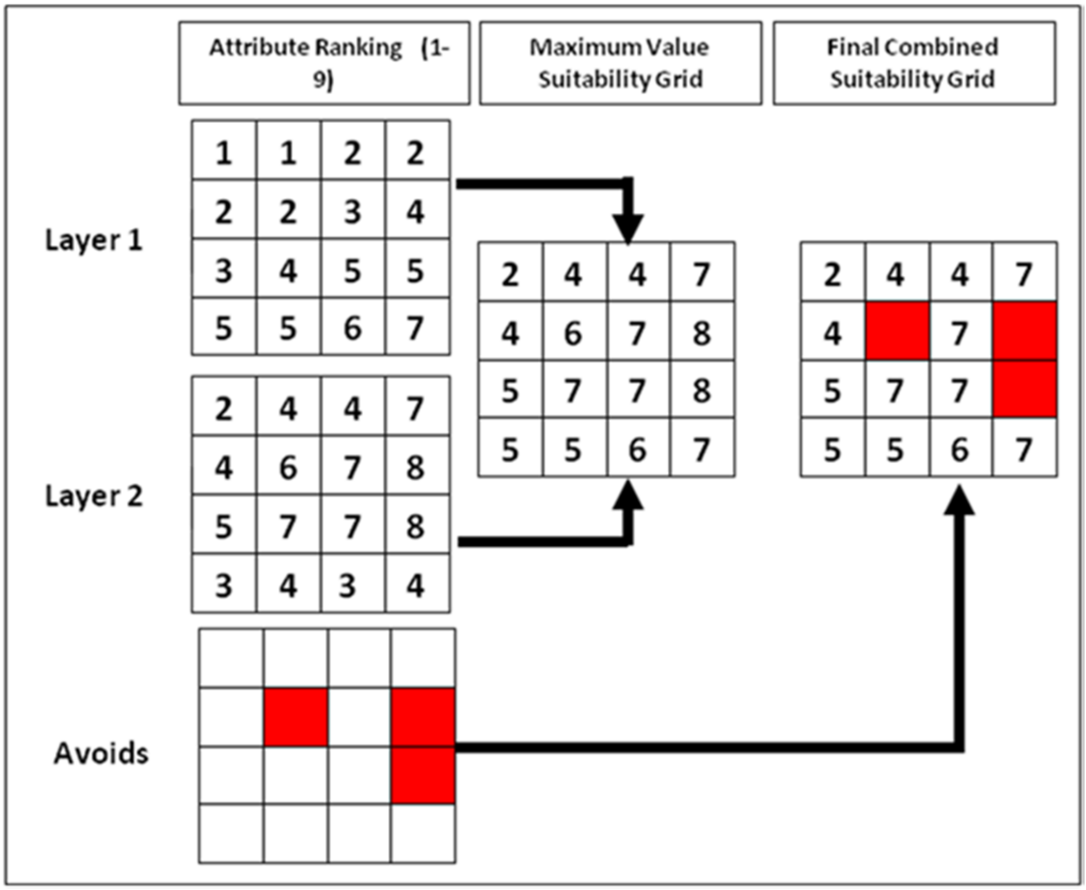


Figure B-4a - Suitability layer creation process

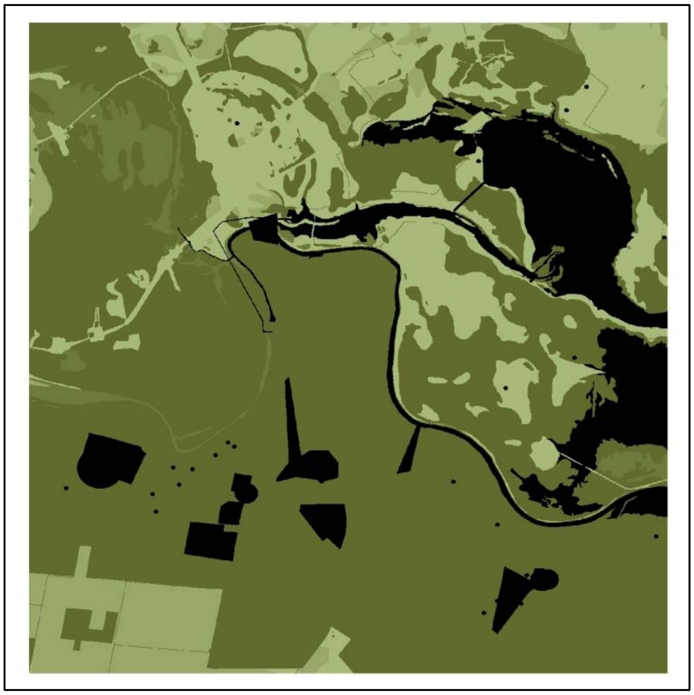


Figure B-4b - Sample suitability layer. The most suitable areas are in light green, the least suitable are dark green, and avoids are black.

Outputs - Once the Suitability layer has been created, AART finds the best path along the Suitability layer between the user-provided start and end points (Figure B-5). The user-defined corridor width is then applied to the path to create the corridor for impacts calculations.

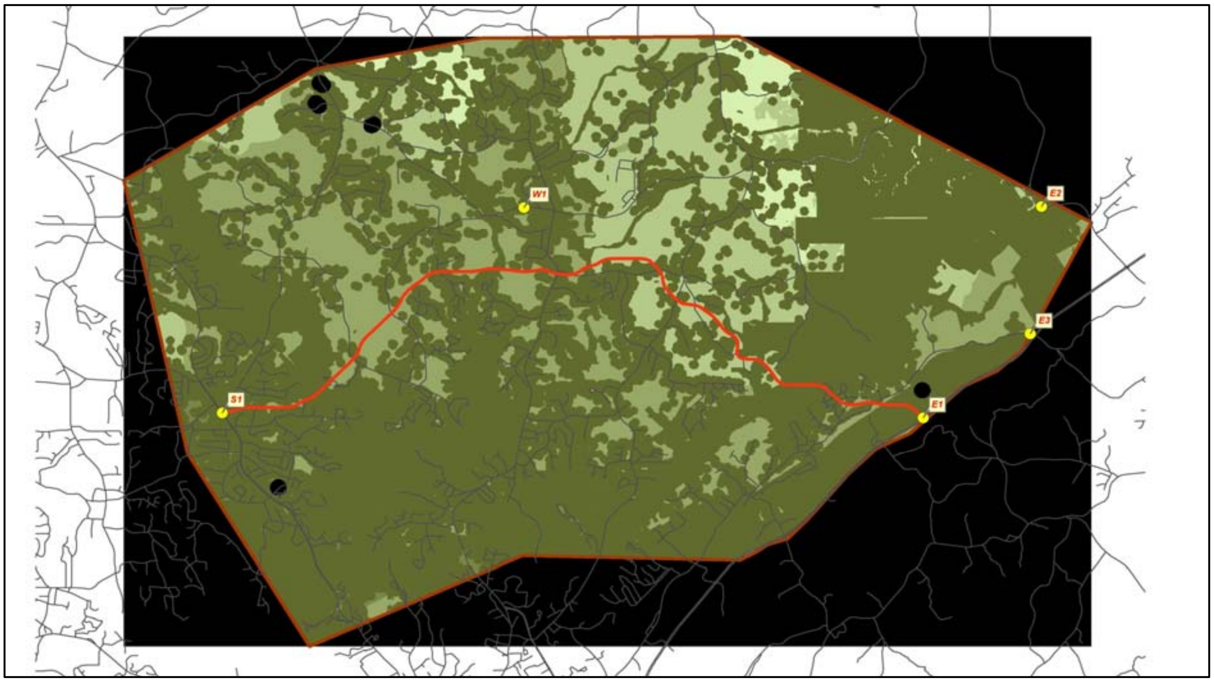


Figure B-5 - AART finds the best path between endpoints by minimizing the crossing of highly-ranked areas.

The AART output also generates a layer showing other potential corridors of interest that may be worth investigating (Figure B-6).

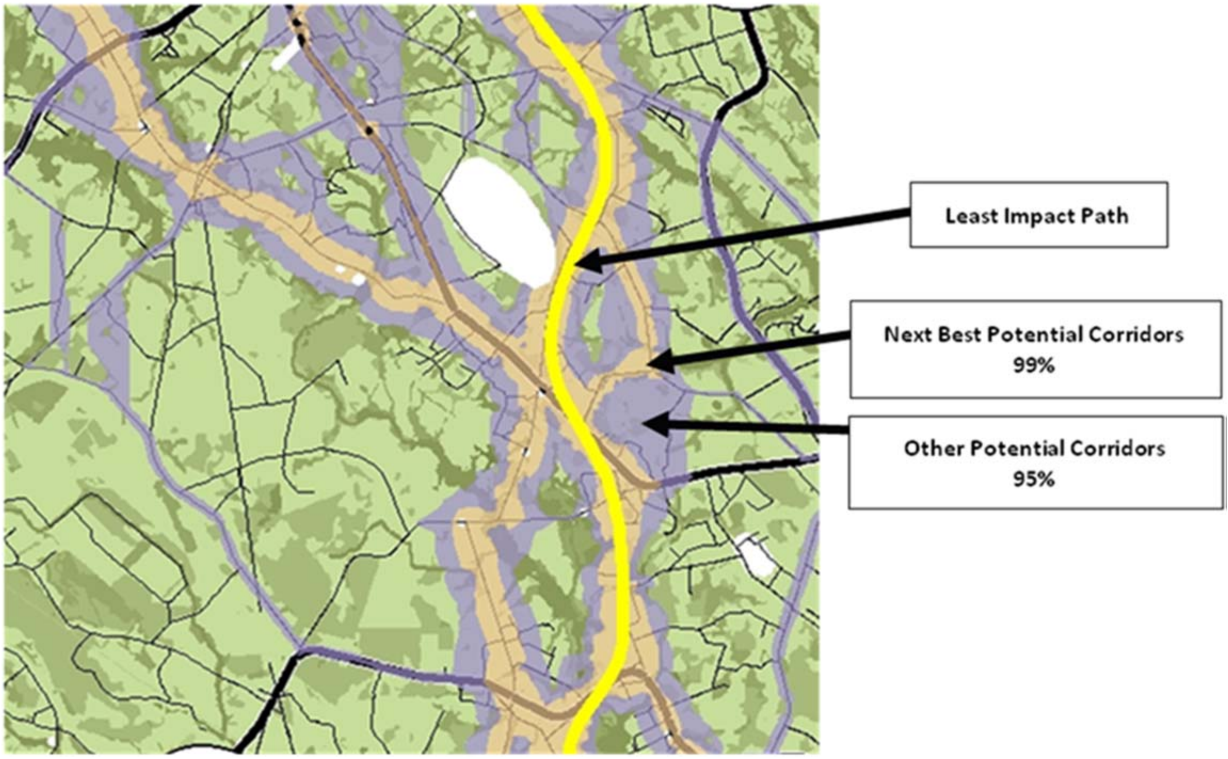


Figure B-6 - Other potential corridors.

The AART also generates a table showing the impacts of the output corridor on polygon, linear, and point features (cultural and environmental). A sample is shown in Figure B-7.

Polygon Impacts			
Layer	**Description**	**Rank**	**Acreage Impact**
arch_shpo_cemeteries	Not Evaluated By Shpo	1	1.19
			1.19
arch_shpo_resourcegroup	Potentially Eligible For Nrhp	5	3.84
			3.84
env_cleanupsites	State Cleanup Site	1	0.71
			0.71
env_habitat	Southeastern American Kestrel	9	14.70
			14.70
env_managedareas	Managed Lands	9	20.29
			20.29
env_outstandingwaters	Outstanding Florida Waters	9	33.80
			33.80
env_wetlands	Wetlands	9	194.01
			194.01
land_aglands	Agriculture	9	525.16
			525.16
land_landuse	Retail/Office	5	92.39
land_landuse	Institutional	9	64.47
land_landuse	Acreage Not Zoned For Agricultur	1	87.45
land_landuse	Industrial	5	14.18

Figure B-7 - Excerpt from impacts table.

Port Bienville Rail Alternatives Development
Technical Methodology Report

APPENDIX C
National Wetlands Inventory Code Groupings

Identification of Wetlands and Deepwater Habitats

I. Estuarine Ecological System (E) - The Estuarine System consists of deepwater tidal habitats and adjacent tidal wetlands that are usually semi enclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land.

A. Bays - Open water between the Barrier Island and the mainland to a point upstream at which salinities are less than 0.5 parts per thousand during low water periods.

1. Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
E1UBLx	Estuarine	Sub-Tidal	Unconsolidated Bottom	N/A	Sub-Tidal	Excavated
E2USNs	Estuarine	Intertidal	Unconsolidated Shore	N/A	Regularly Flooded	Spoil
E2USNx	Estuarine	Intertidal	Unconsolidated Shore	N/A	Regularly Flooded	Excavated
E2USMx	Estuarine	Intertidal	Unconsolidated Shore	N/A	Irregularly Flooded	Excavated
E2USPx	Estuarine	Intertidal	Unconsolidated Shore	N/A	Irregularly Flooded	Excavated

2. Non-Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
E1UBL	Estuarine	Sub-Tidal	Unconsolidated Bottom	N/A	Sub-Tidal	None
E1AB3L	Estuarine	Sub-Tidal	Aquatic Bed	Rooted Vascular	Sub-Tidal	None
E2USM	Estuarine	Intertidal	Unconsolidated Shore	N/A	Irregularly Exposed	None

B. Tidal Flats - Unconsolidated material with less than 30% cover by vegetation and which is exposed by tides.

1. Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
E2USPs	Estuarine	Inter-Tidal	Unconsolidated Shore	Spoil	Irregularly Flooded	Spoil

2. Non-Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
E2USN	Estuarine	Inter-Tidal	Unconsolidated Shore	N/A	Regularly Flooded	None
E2USP	Estuarine	Inter-Tidal	Unconsolidated Shore	N/A	Irregularly Flooded	None

C. Estuarine Intertidal Marsh (Tidal Marsh) - Any salt marsh or other marsh subject to regular or occasional flooding by tides, including wind tides (whether or not the tide waters reach the marshland areas through natural or artificial watercourses), as long as this flooding does not include hurricane or tropical storm waters. Coastal wetland plant species include: smooth cordgrass; black needlerush; glasswort; salt grass; sea lavender; salt marsh bullrush; saw grass; cattail; salt meadow cordgrass; and big/giant cordgrass.

1. Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
E2SS1Pd						

2. Non-Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
E2SS1P	Estuarine					

C. Scrub Marsh - A salt marsh subject to regular or occasional flooding by tides, characterized by scrub-shrub vegetation

1. Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
E2EM1Ps	Estuarine	Sub-Tidal	Emergent	Persistent	Irregularly Flooded	Spoil

2. Non-Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
E2EM1N	Estuarine	Sub-Tidal	Emergent	Persistent	Regularly Flooded	None
E2EM1P	Estuarine	Sub-Tidal	Emergent	Persistent	Irregularly Flooded	None

II. Lacustrine Ecological System (Lakes) - The Lacustrine System includes wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% areal coverage; and (3) total area exceeds 8 ha (20 acres).

A. Freshwater Lakes & Impoundments - Open water areas found within a basin or dammed channel which exceed 20 acres in size with salinities less than 0.5 parts per thousand.

1. Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
L1UBHx	Lacustrine	Limnetic	Unconsolidated Bottom	N/A	Permanently Flooded	Excavated
L1UBKh	Lacustrine	Limnetic	Unconsolidated Bottom	N/A	Artificially Flooded	Diked/ Impounded
L1UBKx	Lacustrine	Limnetic	Unconsolidated Bottom	N/A	Artificially Flooded	Excavated
L2UBFx	Lacustrine	Littoral	Unconsolidated Bottom	N/A	Semi permanently Flooded	Excavated

L2UBKh	Lacustrine	Littoral	Unconsolidated Bottom	N/A	Artificially Flooded	Diked/ Impounded
L2USKh	Lacustrine	Littoral	Unconsolidated Shore	N/A	Artificially Flooded	Diked/ Impounded
L1ABHx	Lacustrine					
L1UBHx	Lacustrine					

2. Non-Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
L2UBF	Lacustrine	Littoral	Unconsolidated Bottom	N/A	Semi permanently Flooded	None

III. Riverine Ecological System (R) - The Riverine System includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts in excess of 0.5 ‰.

A. Rivers & Canals - Channels which at least periodically carry water with salinities less than 0.5 parts per thousand.

2. Non-Disturbed/Naturally Occurring

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
R1UBV	Riverine	Tidal	Unconsolidated Bottom	NA	Permanent-Tidal	None
R2UBF	Riverine	Lower Perennial	Unconsolidated Bottom	NA	Semi permanently Flooded	None
R2UBH	Riverine	Lower Perennial	Unconsolidated Bottom	NA	Permanently Flooded	None

IV. Palustrine Ecological System (P) - The Palustrine System (Fig. 6) includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 ‰. It also includes wetlands lacking such vegetation, but with all of the following four characteristics: (1) area less than 8 ha (20 acres); (2) active wave-formed or bedrock shoreline features lacking; (3) water depth in the deepest part of basin less than 2 m at low water; and (4) salinity due to ocean-derived salts less than 0.5 ‰.

A. Ponds & Borrow Pits - Small fresh water bodies less than 20 acres in size.

1. Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
PUBFh	Palustrine	N/A	Unconsolidated Bottom	None	Semi permanently Flooded	Diked/ Impounded
PUBHh	Palustrine	N/A	Unconsolidated Bottom	None	Permanently Flooded	Diked/ Impounded
PUBHx	Palustrine	N/A	Unconsolidated Bottom	None	Permanently Flooded	Excavated
PUBKx	Palustrine	N/A	Unconsolidated Bottom	None	Artificially Flooded	Excavated
PUBFX	Palustrine	N/A	Unconsolidated Bottom	None	Semi permanently Flooded	Excavated

2. Non-Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
PUBF	Palustrine	N/A	Unconsolidated Bottom	None	Semi permanently Flooded	None
PUBH	Palustrine	N/A	Unconsolidated Bottom	None	Permanently Flooded	None

B. Unvegetated Flats - Areas with less than 30% vegetative cover which are periodically flooded by fresh water.

1. Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
PUSAd	Palustrine	N/A	Unconsolidated Shore	None	Temporary Flooded	Partially Drained/Ditched
Push	Palustrine	N/A	Unconsolidated Shore	None	Temporary Flooded	Diked/ Impounded
PUSAx	Palustrine	N/A	Unconsolidated Shore	None	Temporary Flooded	Excavated
PUSCh	Palustrine	N/A	Unconsolidated Shore	None	Seasonally Flooded	Diked/ Impounded
PUSCx	Palustrine	N/A	Unconsolidated Shore	None	Seasonally Flooded	Excavated
PUSKx	Palustrine	N/A	Unconsolidated Shore	None	Artificially Flooded	Excavated

2. Non-Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
PUSA	Palustrine	N/A	Unconsolidated Shore	None	Temporary Flooded	None
PUSC	Palustrine	N/A	Unconsolidated Shore	None	Seasonally Flooded	None
PUSR	Palustrine	N/A	Unconsolidated Shore	None	Seasonal-Tidal	None

C. Savannahs & Wet Meadows - Herbaceous areas which are flooded only briefly but which may be saturated for long periods during the growing season. Species include pitcher plants, sundews, pogonias, pipeworts, meadow beauties, orchids, yellow-eyed grasses, asters, and goldenrod. Potential species of concern - Canby's Dropwort (Oxypolis canbyi).

1. Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
PEM1Ad	Palustrine	N/A	Emergent	Persistent	Temporary	Partially Drained/Ditched
PEM1Cd	Palustrine	N/A	Emergent	Persistent	Seasonally Flooded	Partially Drained/Ditched
PEM1Ch	Palustrine	N/A	Emergent	Persistent	Seasonally Flooded	Diked/ Impounded
PEM1Cx	Palustrine	N/A	Emergent	Persistent	Seasonally Flooded	Excavated

2. Non-Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
PEM1A	Palustrine	N/A	Emergent	Persistent	Temporary	None
PEM1C	Palustrine	N/A	Emergent	Persistent	Seasonally Flooded	None

D. Freshwater Marshes - Herbaceous areas that are flooded for extended periods during the growing season. Included are marshes within lacustrine systems, managed impoundments, some Carolina bays and other non-tidal marshes (i.e. marshes that do not fall into the Salt/Brackish Marsh category). A tremendous variety of species may occur. Typical communities include species of sedges, millets, rushes and grasses that are not specified in the coastal wetland regulations. Also included are maidencane, giant cane, arrowhead, pickeralweed, arrow arum, smartweed and cattail.

1. Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
PEM1Fh	Palustrine	N/A	Emergent	Persistent	Semi-permanent	Diked/ Impounded
PEM1Fx	Palustrine	N/A	Emergent	Persistent	Semi-permanent	Excavated
PEM1Kx	Palustrine	N/A	Emergent	Persistent	Artificial - Tidal	Excavated
PEM1/SS1Ax	Palustrine	N/A	Emergent/ Scrub-Shrub	Persistent/Broad-Leaved Deciduous	Temporary Flooded	Excavated

PEM1/SS1Cx	Palustrine	N/A	Emergent/ Scrub-Shrub	Persistent/Broad-Leaved Deciduous	Seasonally Flooded	Excavated
PEM1Ah	Palustrine	N/A	Emergent	Persistent	Temporary Flooded	Diked/ Impounded
PEM1Ax	Palustrine	N/A	Emergent	Persistent	Temporary Flooded	Excavated

2. Non-Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
PEM1F	Palustrine	N/A	Emergent	Persistent	Semi-permanent	None
PEM1R	Palustrine	N/A	Emergent	Persistent	Seasonally Flooded Tidal	None
PEM1/SS1A	Palustrine	N/A	Emergent/ Scrub-Shrub	Persistent/Broad-Leaved Deciduous	Temporary Flooded	None
PEM1/SS1J	Palustrine	N/A	Emergent/ Scrub-Shrub	Persistent/ Broad-Leaved Deciduous	Intermittently Flooded	None
PEM1J	Palustrine	N/A	Emergent	Persistent	Intermittently Flooded	None
PEM1/SS1C	Palustrine	N/A	Emergent/ Scrub-Shrub	Persistent/Broad-Leaved Deciduous	Seasonally Flooded	None

E. Aquatic Beds - Areas vegetated by dense mats of vegetation which grow on or below the water surface. Water is permanent or nearly so. Plant species include pondweeds, coontails, duckweeds, lotus, water-lily, spatter-dock and others.

1. Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
PAB4Fh	Palustrine	N/A	Aquatic Bed	Floating Vascular	Semi-permanent	Diked/ Impounded
PAB4Fx	Palustrine	N/A	Aquatic Bed	Floating Vascular	Semi-permanent	Excavated

PAB4Hh	Palustrine		Aquatic Bed			
PAB4Hx	Palustrine		Aquatic Bed			
PAB4Vx	Palustrine		Aquatic Bed			
PABFx	Palustrine		Aquatic Bed			
PABHh	Palustrine		Aquatic Bed			
PABHx	Palustrine		Aquatic Bed			
PABVx	Palustrine		Aquatic Bed			
PAB/UBHx	Palustrine		Aquatic Bed			

1.Non-Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
PAB4V	Palustrine		Aquatic Bed			
PABF	Palustrine		Aquatic Bed			
PABH	Palustrine		Aquatic Bed			

G. Bottomland Hardwoods - Riverine forested or occasionally shrub/scrub communities, usually occurring in floodplains, that are seasonally flooded (typ. winter & spring). Typical species include oaks (overcup, water, laurel, swamp chestnut), sweet gum, hickories, cottonwoods, river birch, green ash, cottonwoods, willows, river birch and occasionally pines (esp. loblolly).

1. Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
PFO1/SS1Cx	Palustrine	N/A	Forested/ Scrub-Shrub	Broad-Leaved Deciduous	Seasonally Flooded	Excavated
PFO1Ax	Palustrine	N/A	Forested	Broad-Leaved Deciduous	Temporarily Flooded	Excavated
PSS1Ah	Palustrine	N/A	Scrub-Shrub	Broad-Leaved Deciduous	Temporarily Flooded	Diked/ Impounded

2. Non-Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
PFO1A	Palustrine	N/A	Forested	Broad-Leaved Deciduous	Temporarily Flooded	None
PSS1A	Palustrine	N/A	Scrub-Shrub	Broad-Leaved Deciduous	Temporarily Flooded	None
PFO1/SS1A	Palustrine	N/A	Forested/ Scrub-Shrub	Broad-Leaved Deciduous	Temporarily Flooded	None
PFO1/SS1C	Palustrine	N/A	Forested/ Scrub-Shrub	Broad-Leaved Deciduous	Seasonally Flooded	None

H. Hardwood Swamp - Very poorly drained riverine or non-riverine forested or occasionally shrub/scrub communities that are semi-permanently flooded, including temporarily flooded depressional systems. Typical species include cypress, black gum, water tupelo, green ash and red maple. We could add Headwater Swamp as separate category denoting a wooded, riverine system occurring along first order streams. These include hardwood-dominated communities with soil that is moist most of the year. Channels receive their water from overland flow and rarely overflow their own banks.

1. Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
PFO1S	Palustrine	N/A	Forested	Broad-Leaved Deciduous	Temporary Tidal	None
PFO1Fx	Palustrine	N/A	Forested	Broad-Leaved Deciduous	Semi permanently Flooded	Excavated

2. Non-Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
PFO1C	Palustrine	N/A	Forested	Broad-Leaved Deciduous	Seasonally Flooded	None

L. Deciduous Shrub Swamps - Usually an early successional stage of the wooded swamp community. These habitats are often the result of clearcutting, beaver ponds, or other disturbance. Plant species may include button bush, alder, red maple, sweet gum, or willow.

1. Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
PSS1Ch	Palustrine	N/A	Scrub-Shrub	Broad-Leaved Deciduous	Seasonally Flooded	Diked/ Impounded
PSS1Cx	Palustrine	N/A	Scrub-Shrub	Broad-Leaved Deciduous	Seasonally Flooded	Excavated
PSS1Fx	Palustrine	N/A	Scrub-Shrub	Broad-Leaved Deciduous	Semi permanently Flooded	Excavated

2. Non-Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
PSS1C	Palustrine	N/A	Scrub-Shrub	Broad-Leaved Deciduous	Seasonally Flooded	None
PSS1F	Palustrine	N/A	Scrub-Shrub	Broad-Leaved Deciduous	Semi permanently Flooded	None
PSS1J	Palustrine	N/A	Scrub-Shrub	Broad-Leaved Deciduous	Intermittently Flooded	None

V. Other - Farmed Wetlands

1. Disturbed

NWI Code	Ecological System	Sub-System	Class	Subclass	Water-Regime	Special Modifier
Pf	Palustrine					Farmed

Port Bienville Rail Alternatives Development
Technical Methodology Report

APPENDIX D
Data Sources

CDM Smith

Category: Environmental				
Layer Description	**Layer Name**	**Feature Type**	**Source**	**Comments**
Threatened & Endangered Species				*Not available*
Critical Habitat		Line, Polygon	USFWS	*Not in Study Area*
Wetlands (NWI)	Wetlands	Polygon	MARIS	
Wetlands Mitigation Sites	wetland_mitig	Polygon	NASA (Stennis), USACE RIBITS, Wetlands Solutions LLC	
Prime Farmlands	PrimeFarmland	Polygon	Geospatial Data Gateway (NRCS/USDA)	Derived from soils
Water Bodies, Linear	nhd_named_streams	Line	MARIS	
Water Bodies, Linear	nhd_othFL	Line	MARIS	Other flow lines
Water Bodies, Areal	nhd_waterb	Polygon	MARIS	
Water Bodies, Areal	nhd_othareas	Polygon	MARIS	Other areas
Floodplain	Floodplain	Polygon	NASA (Stennis Space Center)	
Landfills	Landfill_cells	Polygon	NASA (Stennis Space Center)	FOIA; only for SPCC boundary
Surface Impoundment Areas	SIA	Point	MARIS	
Hazardous Waste Sites	hazardous_waste_sites	Polygon	NASA (Stennis Space Center)	FOIA
RCRA	Rcra	Point	MARIS	
EPA Regulated Facilities	Epa	Point	MARIS	
Tanks, Petroleum	tanks_buff	Point	MARIS	
Toxic Release Inventory Sites	TRI	Point	MARIS	
Underground Storage Tanks	UST	Point	MARIS	
CERCLA 2008	CERCLA2008	Point	MARIS	
CERCLA Site Areas	CERCLA_Site_Areas	Polygon	NASA (Stennis Space Center)	Covers all CERCLA Wells
Mines	Mines	Polygon	MDEQ (provided list)	Created polygons from list
Source Water Protection Areas	SWPA	Polygon	MDEQ	

Category: Cultural and Historical				
Layer Description	**Layer Name**	**Feature Type**	**Source**	**Comments**
Archaeological Sites	ArchSites	Point	NASA (Stennis Space Center)	FOIA; only for SPCC boundary
Archaeological Sites	ArchSites_MDAH	Point	MDAH	
Historic Properties	HistProps_MDAH	Point	MDAH	
National Registry Sites	natreg	Point	MARIS	
Archaeological Site Probability	Arch_Prob	Polygon	NASA (Stennis Space Center)	FOIA; only for SPCC boundary
Cemeteries	Cemetery	Polygon	MARIS	
Churches	Churches	Polygon	MARIS	
Recreation Sites	mri	Polygon	MARIS	
Land Use	LandUse	Polygon	Geospatial Data Gateway (NRCS/USDA)	

INFRASTRUCTURE	Layer Name	Type	Source	Comments
Roads	Roads_TIGER	Line	TIGER	
Railroads	rail_lines	Line	NTAD 2012	
Dams	Dams	Point	MARIS	
Airports	AirportStennis	Polygon	NTAD 2012	Polygons created from aerial photography
Wells, Oil & Gas	oilngas	Point	MARIS	
Wells, Water (USGS)	USGS_Wells	Point	MARIS	
Wells, Water (Dept of Health)	DoHWells	Point	MARIS	
Pipelines, Natural Gas	NatGasPipelines	Line	Stennis Space Center	FOIA; only for SPCC boundary
Gas	msgas	Line	MARIS	
Transmission Lines, major	majr_transm10	Line	MARIS	
Power Lines	PowerLines	Line	NASA (Stennis Space Center)	FOIA; only for SPCC boundary
Water Utility Lines	WaterUtility	Line	NASA (Stennis Space Center)	
Wastewater Utility Lines	WastewaterUtility	Line	NASA (Stennis Space Center)	

JURISDICTIONS	Layer Name	Type	Source	Comments
Stennis Fee Area Boundary	Stennis Space Center	Polygon	Stennis Space Center	FOIA request
Stennis Buffer Zone	Stennis Space Center	Polygon	Stennis Space Center	FOIA request

Port Bienville Rail Alternatives Development Technical Methodology Report

APPENDIX E
Data Used in AART Analyses

CDM Smith

					Base Rankings		Agency Modifications	
ENVIRONMENTAL	**Feature Class Name**	**Feature Type**	**Category**	**Include?**	**Ranking**	**Buffer (ft)**	**USACE**	**EPA**
Wetlands (NWI)	Wetlands	A		Yes				
Estuarine and Marine Deepwater								
Bay (N)			E1UBL	Yes	Avoid			
Bay (D)			E1UBLx	Yes	Avoid			
Estuarine and Marine Wetland								
Scrub Marsh (N)			E2EM1/SS1P	Yes	9			
			E2SS1/EM1P	Yes	9			
			E2SS1P	Yes	9			
Scrub Marsh (D)			E2EM1/SS1Pd	Yes	6			
			E2SS1Pd	Yes	6			
Tidal Marsh (N)			E2EM1N	Yes	Avoid			
			E2EM1P	Yes	Avoid			
Tidal Marsh (D)			E2EM1Nd	Yes	Avoid			
			E2EM1Pd	Yes	Avoid			
Tidal Flat (N)			E2USN	Yes	Avoid			
			E2USP	Yes	Avoid			
Freshwater Emergent Wetland								
Bottomland Hardwood (N)			PEM1/FO1F	Yes	7			
			PEM1/FO1S	Yes	7			
			PFO1/EM1B	Yes	7			
			PFO1/EM1C	Yes	7			
			PFO1/EM1F	Yes	7			
			PFO1/SS1A	Yes	7			
			PFO1/SS1B	Yes	7			
			PFO1/SS1C	Yes	7			
			PFO1/SS1F	Yes	7			
					Base Rankings		Agency	

					Modifications			
ENVIRONMENTAL	Feature Class Name	Feature Type	Category	Include?	Ranking	Buffer (ft)	USACE	EPA
Bottomland Hardwood (N)			PFO1/SS1T	Yes	7			
			PFO1/SS3B	Yes	7			
			PFO1/SS3C	Yes	7			
			PFO1/SS4A	Yes	7			
			PFO1/SS4B	Yes	7			
			PFO1/SS4C	Yes	7			
			PFO1A	Yes	7			
			PFO1B	Yes	7			
			PFO1C	Yes	7			
			PFO1E	Yes	7			
			PFO1F	Yes	7			
			PFO1R	Yes	7			
			PFO1S	Yes	7			
			PFO1T	Yes	7			
Bottomland Hardwood (D)			PFO1/SS1Ad	Yes	6			
			PFO1Ad	Yes	6			
			PFO1As	Yes	6			
			PFO1Bd	Yes	6			
			PFO1Cd	Yes	6			
			PFO1Fd	Yes	6			
			PFO1Fx	Yes	6			
			PFO1Sd	Yes	6			
Freshwater Marsh (N)			PEM1/SS1B	Yes	9			
			PEM1/SS1F	Yes	9			
			PEM1/SS1R	Yes	9			
			PEM1/SS1T	Yes	9			
			PEM1/SS3B	Yes	9			
			PEM1/SS4B	Yes	9			
			PEM1/SS4E	Yes	9			
			PEM1/SS4R	Yes	9			

					Base Rankings		Agency Modifications	
ENVIRONMENTAL	Feature Class Name	Feature Type	Category	Include?	Ranking	Buffer (ft)	USACE	EPA
Freshwater Marsh (N)			PEM1B	Yes	9			
			PEM1F	Yes	9			
			PEM1R	Yes	9			
			PEM1S	Yes	9			
			PEM1T	Yes	9			
Freshwater Marsh (D)			PEM1/SS3Bd	Yes	6			
			PEM1/SS3Fx	Yes	6			
			PEM1Ax	Yes	6			
			PEM1Bd	Yes	6			
			PEM1Fh	Yes	6			
			PEM1Fx	Yes	6			
			PEM1Kh	Yes	6			
			PEM1Sd	Yes	6			
			PEM1Td	Yes	6			
Savannah (N)			PEM1/SS1A	Yes	9			
			PEM1/SS1C	Yes	9			
			PEM1/SS3C	Yes	9			
			PEM1/SS4C	Yes	9			
			PEM1A	Yes	9			
			PEM1C	Yes	9			
Savannah (D)			PEM1/SS1Cx	Yes	6			
			PEM1/SS4Cd	Yes	6			
			PEM1Cd	Yes	6			
			PEM1Cx	Yes	6			
Freshwater Forested/Shrub Wetland								
Forested Swamp (N)			PFO1/2C	Yes	7		9	9
			PFO1/2F	Yes	7		9	9
			PFO1/2R	Yes	7		9	9
			PFO1/2S	Yes	7		9	9
			PFO1/2T	Yes	7		9	9

			PFO1/3A	Yes	7		9	9
					Base Rankings		**Agency Modifications**	
ENVIRONMENTAL	**Feature Class Name**	**Feature Type**	**Category**	**Include?**	**Ranking**	**Buffer (ft)**	**USACE**	**EPA**
Forested Swamp (N)			PFO1/3B	Yes	7		9	9
			PFO1/3C	Yes	7		9	9
			PFO1/3F	Yes	7		9	9
			PFO1/4A	Yes	7		9	9
			PFO1/4B	Yes	7		9	9
			PFO1/4C	Yes	7		9	9
			PFO1/4E	Yes	7		9	9
			PFO1/4F	Yes	7		9	9
			PFO1/4R	Yes	7		9	9
			PFO1/4S	Yes	7		9	9
			PFO2/1C	Yes	7		9	9
			PFO2/1F	Yes	7		9	9
			PFO2/1R	Yes	7		9	9
			PFO2/4B	Yes	7		9	9
			PFO2/4C	Yes	7		9	9
			PFO2/EM1F	Yes	7		9	9
			PFO2B	Yes	7		9	9
			PFO2F	Yes	7		9	9
			PFO2R	Yes	7		9	9
			PFO3/1A	Yes	7		9	9
			PFO3/1B	Yes	7		9	9
			PFO3/1C	Yes	7		9	9
			PFO3/4B	Yes	7		9	9
			PFO3/EM1B	Yes	7		9	9
			PFO3B	Yes	7		9	9
			PFO3C	Yes	7		9	9
			PFO4/1A	Yes	7		9	9
			PFO4/1B	Yes	7		9	9
			PFO4/1C	Yes	7		9	9

ENVIRONMENTAL	Feature Class Name	Feature Type	Category	Include?	Base Rankings		Agency Modifications	
					Ranking	Buffer (ft)	USACE	EPA
			PFO4/1R	Yes	7		9	9
			PFO4/1S	Yes	7		9	9
Forested Swamp (N)			PFO4/3A	Yes	7		9	9
			PFO4/3B	Yes	7		9	9
			PFO4/EM1B	Yes	7		9	9
			PFO4/EM1C	Yes	7		9	9
			PFO4/SS1B	Yes	7		9	9
			PFO4/SS1C	Yes	7		9	9
			PFO4/SS3B	Yes	7		9	9
			PFO4/SS4A	Yes	7		9	9
			PFO4/SS4B	Yes	7		9	9
			PFO4/SS4C	Yes	7		9	9
			PFO4/SS4R	Yes	7		9	9
			PFO4A	Yes	7		9	9
			PFO4B	Yes	7		9	9
			PFO4C	Yes	7		9	9
			PFO4F	Yes	7		9	9
			PFO4R	Yes	7		9	9
			PEM1/FO3B	Yes	7		9	9
			PEM1/FO4B	Yes	7		9	9
			PEM1/FO4C	Yes	7		9	9
Forested Swamp (D)			PFO1/2Fb	Yes	6		9	7
			PFO1/3Bd	Yes	6		9	7
			PFO1/3Cd	Yes	6		9	7
			PFO1/4Ad	Yes	6		9	7
			PFO1/4Bd	Yes	6		9	7
			PFO1/4Cd	Yes	6		9	7
			PFO2/1Fd	Yes	6		9	7
			PFO3/1Cd	Yes	6		9	7
			PFO4/1Ad	Yes	6		9	7
			PFO4/1Bd	Yes	6		9	7

			PFO4/1Cd	Yes	6		9	7
			PFO4/3Bd	Yes	6		9	7
					Base Rankings		**Agency Modifications**	
ENVIRONMENTAL	**Feature Class Name**	**Feature Type**	**Category**	**Include?**	**Ranking**	**Buffer (ft)**	**USACE**	**EPA**
Forested Swamp (D)			PFO4Ad	Yes	6		9	7
			PFO4Bd	Yes	6		9	7
			PFO4Cd	Yes	6		9	7
Shrub Swamp (N)			PSS1/2C	Yes	5		9	9
			PSS1/2F	Yes	5		9	9
			PSS1/2R	Yes	5		9	9
			PSS1/2T	Yes	5		9	9
			PSS1/3B	Yes	5		9	9
			PSS1/3C	Yes	5		9	9
			PSS1/4A	Yes	5		9	9
			PSS1/4B	Yes	5		9	9
			PSS1/4C	Yes	5		9	9
			PSS1/4F	Yes	5		9	9
			PSS1/4R	Yes	5		9	9
			PSS1/4S	Yes	5		9	9
			PSS1/EM1A	Yes	5		9	9
			PSS1/EM1B	Yes	5		9	9
			PSS1/EM1C	Yes	5		9	9
			PSS1/EM1R	Yes	5		9	9
			PSS1/EM1S	Yes	5		9	9
			PSS1/EM1T	Yes	5		9	9
			PSS1/FO1R	Yes	5		9	9
			PSS1/FO1S	Yes	5		9	9
			PSS1/FO2F	Yes	5		9	9
			PSS1/FO4A	Yes	5		9	9
			PSS1/FO4B	Yes	5		9	9
			PSS1/FO4C	Yes	5		9	9
			PSS1/FO4R	Yes	5		9	9
			PSS1A	Yes	5		9	9

			PSS1B	Yes	5		9	9
			PSS1C	Yes	5		9	9
					Base Rankings		**Agency Modifications**	
ENVIRONMENTAL	**Feature Class Name**	**Feature Type**	**Category**	**Include?**	**Ranking**	**Buffer (ft)**	**USACE**	**EPA**
Shrub Swamp (N)			PSS1F	Yes	5		9	9
			PSS1R	Yes	5		9	9
			PSS1S	Yes	5		9	9
			PSS1T	Yes	5		9	9
			PSS3/1B	Yes	5		9	9
			PSS3/1C	Yes	5		9	9
			PSS3/4B	Yes	5		9	9
			PSS3/EM1B	Yes	5		9	9
			PSS3/EM1C	Yes	5		9	9
			PSS3/FO1C	Yes	5		9	9
			PSS3/FO4B	Yes	5		9	9
			PSS3B	Yes	5		9	9
			PSS3C	Yes	5		9	9
			PSS4/1A	Yes	5		9	9
			PSS4/1B	Yes	5		9	9
			PSS4/1C	Yes	5		9	9
			PSS4/3B	Yes	5		9	9
			PSS4/EM1A	Yes	5		9	9
			PSS4/EM1C	Yes	5		9	9
			PSS4/FO4C	Yes	5		9	9
			PSS4A	Yes	5		9	9
			PSS4B	Yes	5		9	9
			PSS4C	Yes	5		9	9
			PSS4F	Yes	5		9	9
			PSS4R	Yes	5		9	9
			PSS4S	Yes	5		9	9
			PSS5F	Yes	5		9	9
Shrub Swamp (D)			PSS1/3Bd	Yes	4		9	7
			PSS1/4Bd	Yes	4		8	7

			PSS1/4Cd	Yes	4		8	7
			PSS1/FO1Bd	Yes	4		8	7
					Base Rankings		Agency Modifications	
ENVIRONMENTAL	**Feature Class Name**	**Feature Type**	**Category**	**Include?**	**Ranking**	**Buffer (ft)**	**USACE**	**EPA**
Shrub Swamp (D)			PSS1/FO1Cx	Yes	4		8	7
			PSS1Cb	Yes	4		8	7
			PSS1Cd	Yes	4		8	7
			PSS1Ch	Yes	4		8	7
			PSS1Cx	Yes	4		8	7
			PSS1Fh	Yes	4		8	7
			PSS1Fx	Yes	4		8	7
			PSS1Td	Yes	4		8	7
			PSS3Cd	Yes	4		8	7
			PSS3Fx	Yes	4		8	7
			PSS4/1Bd	Yes	4		8	7
			PSS4/1Cd	Yes	4		8	7
			PSS4/1Cx	Yes	4		8	7
			PSS5Fx	Yes	4		8	7
Freshwater Pond								
Aquatic Bed (N)			PAB4V	Yes	7			
			PABF	Yes	7			
			PABH	Yes	7			
Aquatic Bed (D)			PAB/UBHx	Yes	5			
			PAB4Hh	Yes	5			
			PAB4Hx	Yes	5			
			PAB4Vx	Yes	5			
			PABFx	Yes	5			
			PABHh	Yes	5			
			PABHx	Yes	5			
			PABVx	Yes	5			
Pond (N)			PUBH	Yes	5			
			PUBV	Yes	5			
Pond (D)			PUBFx	Yes	4			

			PUBHh	Yes	4			
			PUBHx	Yes	4			
					Base Rankings		Agency Modifications	
ENVIRONMENTAL	Feature Class Name	Feature Type	Category	Include?	Ranking	Buffer (ft)	USACE	EPA
Pond (D)			PUBVh	Yes	4			
			PUBVx	Yes	4			
			PUSAx	Yes	4			
			PUSCx	Yes	4			
			PUBVh	Yes	4			
			PUBVx	Yes	4			
			PUSAx	Yes	4			
			PUSCx	Yes	4			
Lake								
Lake (D)			L1ABHx	Yes	9			
			L1UBHx	Yes	9			
Riverine								
Tidal River (N)			R1UBV	Yes	Avoid			
Tidal River (D)			R1UBVx	Yes	Avoid			
River (N)			R2UBH	Yes	7		9	9
			R2US2C	Yes	7		9	9
			R2USA	Yes	7		9	9
			R2USC	Yes	7		9	9
River (D)			R2UBHx	Yes	7		9	9
Other								
Wetlands Mitigation Sites	wetland_mitig	A		Yes	9			
Prime Farmlands	PrimeFarmland	A						
			Prime Farmland	Yes	4			
			Statewide Importance	Yes	4			
			Prime if drained	No				
			Prime if drained & protected	No				
Water Bodies, Linear	nhd_named_streams	L		Quantify				6

Water Bodies, Linear	nhd_othFL	L		Quantify				3
Streams, 303d	Streams_303d	L		Quantify				
Water Bodies, Areal	nhd_waterb	A		Yes	9			9
					Base Rankings		**Agency Modifications**	
ENVIRONMENTAL	**Feature Class Name**	**Feature Type**	**Category**	**Include?**	**Ranking**	**Buffer (ft)**	**USACE**	**EPA**
Water Bodies, Areal	nhd_othareas	A		Quantify				9
Landfills	Landfill_cells	A		Yes	9			
Surface Impoundment Areas	SIA_buff	P		Yes	9	500		
Hazardous Waste Sites	hazardous_waste_sites	A		Yes	Avoid			
RCRA	rcra_buff	P		Yes	Avoid			
EPA	epa_buff	P		Yes	Avoid			
Tanks	tanks_buff	P		Yes	Avoid			
Toxic Release Inventory	tri_buff	P		Yes	Avoid			
Underground Storage Tanks	UST_buff	P		Yes	Avoid			
CERCLA 2008	CERCLA2008_buff	P		Yes	Avoid			
CERCLA Site Areas	CERCLA_Site_Areas	A		Yes	Avoid			
Mines	Mines	A		Yes	Avoid			

cdmsmith.com

HANCOCK
MISSISSIPPI
PORT • AIR • SPACE

MDOT
MISSISSIPPI DEPARTMENT OF TRANSPORTATION

Federal Railroad Administration

Port Bienville Railroad Environmental Impact Statement

August 8, 2016

Segment Comparison

Table of Contents

List of Tables

List of Figures

Introduction

Project Description

Mississippi Department of Transportation, in coordination with Federal Railroad Administration (FRA), conducted a Feasibility Study and is pursuing the appropriate Environmental Impact Statement (EIS) for the location of a new railroad line to connect the Port of Bienville Short Line Railroad, located at the Port Bienville Industrial Park (Port), Hancock County, with the Norfolk Southern Railroad in the vicinity of Nicholson in Pearl River County.

The goal of this project is to identify feasible alternatives and to obtain an approved environmental document for the preferred location of this proposed rail line. This project includes two phases. The first phase, Phase 1, determined the feasibility of constructing and operating the rail line, reasonable alternative corridors for consideration, and the economic benefits including potential funding sources. The second phase, Phase 2, includes the preparation of an environmental impact statement based on the known existing conditions to determine potential human and natural environment impacts of the project.

Study Area

The study area, in general, encompasses a portion of Hancock and Pearl River Counties. The project study area is generally bounded by Nicholson to the north, Port Bienville Industrial Park to the south, the Pearl River to the west, and Stennis International Airport and Kiln to the east, representing a study area of approximately 180 square miles. The proposed railway corridor is expected to be approximately 24 miles in length.

Alternatives Analysis

A key milestone in the EIS process is identification of a range of reasonable alternatives to be evaluated. The No Build Alternative, as required by NEPA, will serve as the basis for comparison of the environmental impacts of build or action alternatives in the EIS.

The purpose of this report is to detail the process by which the project team developed initial corridors for the proposed project through Phase 1, the Feasibility Study, refined the range alternatives from 1,000 foot corridors to 200 foot alternatives, and screened alternatives using GIS to determine the range of reasonable alternatives, as required by NEPA, that would be further evaluated in the EIS.

The complete alternatives development process will be summarized in the Alternatives chapter of the EIS and this report will be included as an Appendix of the EIS.

Phase 1 – Feasibility Alternatives

During Phase 1, Feasibility Study, the selection of alternatives included the use of an automated tool to assist and accelerate the identification and evaluation of the preliminary build alternatives. The Alignment Alternatives Research Tool (AART) is a series of GIS-based spatial analysis functions designed to route conceptual alignments among the various natural and human resources within a project study area. The tool is capable of running numerous alignment scenarios to produce alternatives that avoid and minimize impacts upon the natural and human environment. The AART is combined with limited field reconnaissance and data validation, engineering design criteria, and review by the project team to efficiently evaluate many preliminary alternatives within a large study area.

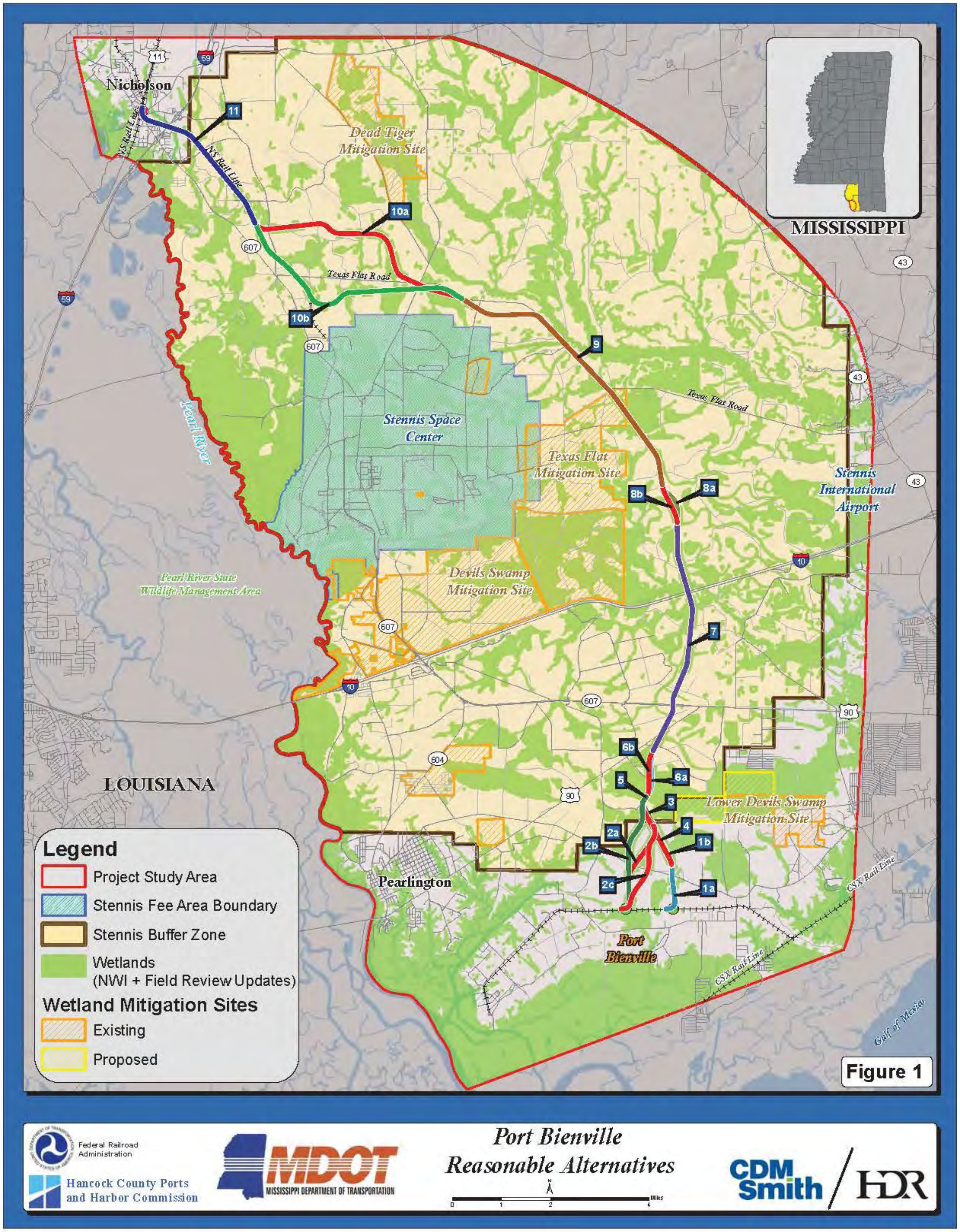
The alternatives are developed through a simple "avoidance and minimization" approach. This approach allows the project team, which includes experts in various fields, to efficiently assess resources within the project boundaries. Sensitive site-specific resources can be set as avoids, and weighted values (1-9) given for other various types of resources that have been mapped to the grid cells in the study area. The tool routes alignments between user-selected endpoints through an artificial "terrain" comprised of areas of value and unique site-specific resources. Areas that have been set as avoids are automatically avoided while locating a path that minimizes impacts to the remaining resources.

The AART is designed to route conceptual alignments among the various natural and human resources within a study area. The program allows users to interactively weight geographic features and attributes collected from public and project-derived databases. Individual data layers are assigned rankings to provide criteria for the AART to create a path of least impact. Areas that are ranked low, such as less sensitive resources, are used over a highly sensitive resource. The desired corridor width is then applied and the environmental and cultural impacts of the corridor are calculated. The AART is used to summarize the impacts for each alternative alignment and display a potential alignment for each model run. In summary, the "corridors" are developed through a simple "opportunities and constraints" approach.

For the project, the AART was used to develop approximately 90 alignments through the study area. Impacts were summarized based on the refined 1,000-foot wide corridors. The impacts within these 1,000-foot wide corridors and the initial cost estimates for the engineered alignments were used for comparing one alternative to another and further refinement.

To further define the Reasonable Alternatives, the study team divided these corridors into segments, as identified in **Figure 1**. At the conclusion of Phase 1, these 17 segments represent a possible combination of 40 potential alternatives. Please see further details about the development of alternatives in Phase 1, in the Port Bienville Rail Feasibility Study and Alternatives Development Technical Methodology, located online at www.gomdot.com.

FIGURE 1: CORRIDOR SEGMENTS



Phase 2 - Initial Alternatives Screening

At the initiation of the Phase 2 Alternatives Analysis, there were 40 potential alternatives carried forward from Phase 1. To determine which alternatives would be further evaluated in the EIS, the alignments from the AART were refined as described below and the project team performed further screenings of the segments.

The Phase 2 screenings began with initial field site investigations and review of color infrared aerial photography in order to update and refine wetland boundaries from the National Wetland Inventory (NWI) mapping, which was used during Phase 1. As a result, the NWI mapping file was updated within a 1,000-foot wide corridor along each segment. Based on these initial field efforts, most of the segments were found to contain more wetlands than what is shown on the NWI mapping.

A cultural resources predictive model study was performed to identify high, medium, and low probability areas for potential archaeological resources. The results of this study were mapped in a GIS file and added to the project database. Additionally, new GIS data files of the study area were obtained and added to the database of information. A re-quantification of impacts for each segment was prepared utilizing this updated and more detailed information.

Following the update of all GIS data for the study area, the segment corridor widths were refined to 200 feet centered about the centerline of each segment. It is anticipated that the right-of-way for the new rail bed would be less than a 100 feet; therefore, a 200-foot-wide corridor assessment was used to more accurately reflect potential impacts. Impacts for each segment were recalculated using the AART.

Although the available data are meaningful for planning purposes only, the quantities demonstrate a potential magnitude of impact. Each alternative has advantages and disadvantages in the areas of engineering, environmental, operations, cost, and other associated factors.

Evaluation Measures

Evaluation measures were also identified and used to compare similar (competing) segments located along parallel alignments. These measures were divided into 4 sections as follows: Engineering Criteria, Natural Features, Man-made Features and Infrastructure. To standardize the comparison, the segments were compared from common connection points. For some comparisons, segments were combined, but in all cases they were compared equally from a common beginning and ending point.

- **Engineering Criteria** - The engineering factors were calculated based upon the preliminary alignment geometry for each segment, and comparison to aerial photography and GIS data. The engineering factors considered for comparison include the following:
  - Alignment Information - The alignment statistics include total length of the new alignment, length of existing Norfolk Southern (NS) spur line utilized, length of

existing Port Bienville Railroad (PBVR) utilized east of beginning point of Segment 2a, the number of new at-grade crossings on paved roadways and the estimated total length of bridges/trestles over wetlands.

- Implementation Cost - After the alignments were developed, preliminary cost estimates were prepared for the railroad design, right-of-way acquisition and construction. Unit costs were derived from average cost history for similar construction. Separate estimates were developed for upgrade of the existing rail bed between Stennis Space Center (SSC) and Nicholson for the segments that incorporate this section of NS rail line.

- **Natural Features -** The Natural Features were summarized for each segment based upon the preliminary rail alignments and a corridor width of 200 feet centered along these alignments. The Natural Features were determined from GIS data.
  - The Natural Features include the acres of wetlands, the acres of wetland Mitigation Bank, wetland shading associated with trestle bridges over wetlands, the number of stream crossings, the total length of crossings and the estimated mitigation cost for these crossings.
- **Man-made Features –** Most of the study area is undeveloped because of the building restrictions on the land within the SSC acoustical buffer zone. These restrictions prohibit the construction of any habitable buildings. However, other man-made features are allowed and were considered when comparing segments. Additionally, the very northern portion of the study area and the very southern portion of the study area lie outside of the acoustical buffer zone. The man-made features include acres of hazardous material sites, acres of farmland (prime, prime if drained, and statewide importance), acres of open pit mines and properties with mining permits, acres of former military bombing ranges, and acres of potential archaeological sites.
- **Infrastructure –** The final category of features taken into consideration when comparing segments included existing Infrastructure. The uniqueness of the SSC acoustical buffer zone greatly limits the type and number of infrastructure within the study area. This category includes numbers of major utilities such as power transmission lines and natural gas pipelines that may be crossed by segments and acres of water supply wells that may encounter proximity impacts.

Similar/Competing Segment Analysis

Segments 1a, 1b, 2a, 2b, 2c, 3 and 4

South of US 90/Chef Menteur Highway are the 7 segments that represent the southernmost portion of the study area. The majority of these segments are located outside of the SSC acoustical buffer zone. These segments, when combined, represent 5 potential routes that would provide the first section of the new rail alignment to connect the PBVR, north through Hancock and Pearl River Counties to the NS railroad line in Nicholson, MS (See Figure 2). The segments were combined in order to create 5 alignments that could be compared equally.

Three of these potential routes, each beginning with Segment 2, would connect with the PBVR approximately 1.64 miles east of the entrance to the Port Bienville Industrial Park. The other 2 potential routes, each beginning with Segment 1a, would connect with the PBVR approximately 2.64 miles east of the Port Bienville Industrial Park. The eastern route combinations would utilize 1 additional mile of the existing PBVR rail line, making the total length longer than the routes that begin to the west. No cost or environmental impacts have been identified with this additional track length since it is an existing track, in good working condition, which would not require upgrade or modification.

Segment 5 would be the common northern junction point for all five of these southernmost potential routes. During the Phase 1 evaluation these routes were found to have similar potential environmental impacts and costs; therefore, as none of the possible routes stood out as a preferred option, it was recommended that they all be carried forward to Phase 2 for further investigation.

The five potential route combinations, which were created by combining the Phase 1 segments, are shown in **Figure 2:**

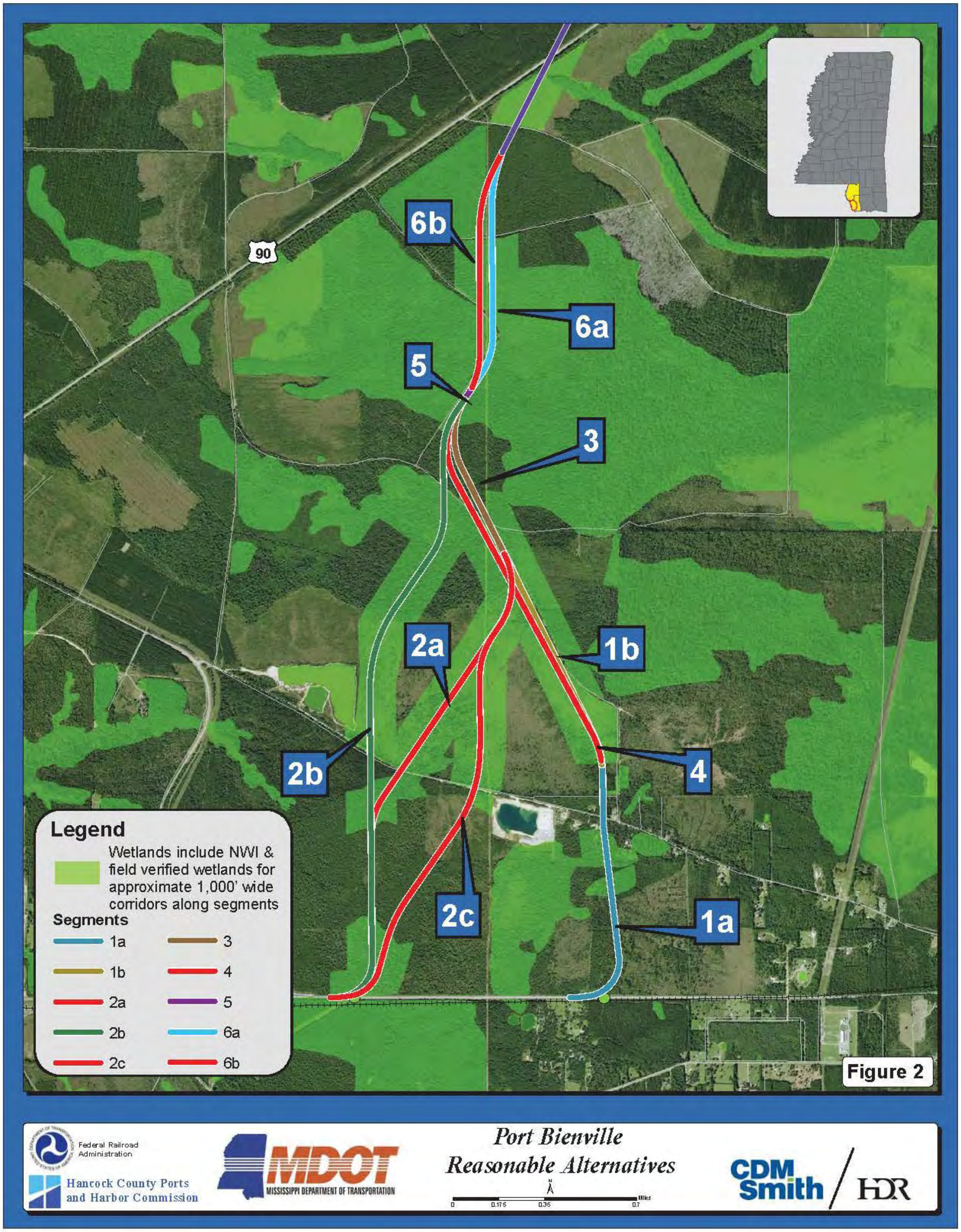
- 1a + 1b + 3
- 1a + 4
- 2a + 3
- 2b
- 2c and+ 3

These potential route combinations are described below.

Segments 1a+ 1b+ 3 begin with what would become the southern terminus of the new location rail line, Segment 1a, which starts approximately 2.64 miles east of where Lower Bay Road crosses the PBVR tracks. Segment 1a extends north and crosses Old Lower Bay Road approximately 0.2 mile east of a mine/quarry site. Approximately 0.2 mile north of Old Lower Bay Road, Segment 1a meets Segment 1b, which extends in a northwesterly direction paralleling an unimproved roadway. Segment 1b then connects to Segment 3, which extends northwesterly until it curves to the northeast before connecting to Segment 5. Due to the location and type of wetland crossings, some trestle-bridging is anticipated along this potential route. The total length for the three segments is 2.55 miles. The additional 1 mile of track usage along the existing PBVR totals 3.55 miles for this potential route.

Segments 1a + 4 begin at the PBVR tracks extending north with what would become the southern terminus of the new location rail line. Segment 1a starts approximately 2.64 miles east of where Lower Bay Road crosses the PBVR tracks. Segment 1a extends north and crosses Old Lower Bay Road approximately 0.2 mile east of a mine/quarry site. Once it crosses Old Lower Bay Road, Segment 1a connects to Segment 4, which parallels Segments 1b and 3 to the west. Segment 4 then turns to the northeast to connect to Segment 5. Due to the location and type of wetlands being crossed, some trestle-bridging is anticipated along this potential route. The total length for the two segments is 2.56 miles. The additional 1 mile of track usage along the existing PBVR totals 3.56 miles for this potential route.

FIGURE 2: POTENTIAL ROUTE COMBINATIONS



Segments 2a + 3 begin at the PBVR short line, but 1 mile closer to the Port Bienville Industrial Park. Segment 2a extends north for approximately 1 mile, then turns northeast and crosses Old Lower Bay Road, then turns northwest to connect to Segment 3. Segment 3 extends northwesterly until it curves to the northeast to connect to Segment 5. Due to the location and type of wetlands being crossed, some trestle-bridging is anticipated along this potential route. The total length for this potential route is 2.59 miles.

Segment 2b also begins at the PBVR short line, closer to the Port Bienville Industrial Park. Segment 2b extends north for approximately 1.5 miles. After crossing Old Lower Bay Road, the segment turns northeast for 0.5 mile before turning north again to connect to Segment 5. Due to the location and type of wetlands being crossed, some trestle-bridging is anticipated along this potential route. The total length of this potential route is 2.47 miles.

Segments 2c + 3 also begin at the PBVR short line, close to the Port Bienville Industrial Park. Segment 2c extends in a northeasterly direction, and crosses Old Lower Bay Road west of a mine/quarry site. Its alignment meanders in an "S" shape as it extends to connect to Segment 3. Segment 3 extends northwesterly until it curves to the northeast before connecting to Segment 5. Due to the location and type of wetlands being crossed, some trestle-bridging is anticipated along this potential route. The total length of this potential route is 2.59 miles.

Table 1 contains a side by side comparison of the alignments.

TABLE 1: COMPARISON MATRIX FOR COMBINED SEGMENTS

Description	Unit of Measure	Segment(s)				
		1a+1b+3	1a+4	2a+3	2b	2c +3
ENGINEERING CRITERIA						
Total Length	Miles	2.55	2.56	2.59	2.47	2.59
Length Utilizing the Existing NS Rail Bed	Miles	0.00	0.00	0.00	0.00	0.00
Length Utilizing the Existing PBVR east of 2a, 2b & 2c	Miles	1.00	1.00	0.00	0.00	0.00
New At-Grade Rail Crossings (Paved Roads)	# of Crossings	1	1	1	1	1
Estimated Length of Wetland Bridging	LF	430	430	430	430	430
Total Estimated Implementation Cost **(1)**	$ Millions	$10.87	$10.99	$11.58	$11.39	$11.44
NATURAL FEATURES						
Wetland Impacts **(2)**	Acreage	29.03	31.57	41.60	42.57	35.48
Shading Impacts	Acreage	0.15	0.15	0.15	0.15	0.15
Cost of Wetland Mitigation **(3)**	$60K per acre @ 50%	$870,900	$947,100	$1,248,000	$1,277,100	$1,064,400
Proposed Texas Flat Mitigation Bank	Acreage	0.00	0.00	0.00	0.00	0.00
Cost of Mitigating Impacts to Mitigation Bank	$120K per acre @ 50%	$0	$0	$0	$0	$0
Streams 303(d)/TMDL's	# of Crossings	0	0	0	0	0
Streams 303(d)/TMDL's	Length (miles)	0.00	0.00	0.00	0.00	0.00
Stream Crossings	# of Crossings	0	0	1	1	1
Total Stream Impacts	Feet	0	0	265	250	290
Cost of Streams Mitigation **(3)**	$200 per linear feet @ 50%	$0	$0	$26,500	$25,000	$29,000
MAN-MADE FEATURES						
MDEQ CERCLA/Haz Mat sites	Acreage	0.00	0.00	0.00	0.00	0.00
Archaeological Sites						
High Probability	Acreage	28.21	27.75	17.66	13.87	15.59
Medium Probability	Acreage	14.76	13.05	19.96	17.24	26.74
Farmland (Prime)	Acreage	1.49	1.49	0.00	0.00	0.28
Farmland (Prime if Drained)	Acreage	18.38	18.84	22.37	19.05	22.59
Farmland (Statewide Importance)	Acreage	0.00	0.00	0.00	0.00	0.00
Mines	Acreage	0.00	0.00	0.00	5.78	2.26
Bombing Ranges	Acreage	0.00	0.00	0.00	0.00	0.00
INFRASTRUCTURE						
Water Wells	Acreage	0.00	0.00	0.00	0.00	0.00
Transmission Line Crossings	#	0	0	0	0	0
Gas Line Crossings	#	0	0	0	0	0

(1) Cost Estimates updated in October 2015
(2) Wetland Impacts are based on NWI Mapping & Ground Truthing performed in the Spring 2015
(3) Cost assumes a 100 foot wide rail bed

Summary

During Phase 1, it was deemed prudent to consider two possible tie-in locations along the PBVR. Two tie-in locations would provide an alternative route in the event that constraints and/or significant concerns from an agency or tribal consultation were identified at one location. In moving forward with the Phase 2 analysis, this same philosophy carries through the comparison of segments. The first connection point with PBVR includes Segments 2a, 2b and 2c, which are located approximately 1.64 miles east of the entrance to the Port Bienville Industrial Park. The second connection point with PBVR is located approximately 2.64 miles east of the entrance to the Port Bienville Industrial Park and begins as Segment 1a.

In keeping with the intent to evaluate two possible tie-in locations along the PBVR, the following summary provides the advantages and disadvantages of these combined southernmost segments. This summary is provided for both an eastern tie-in location and a western tie-in location.

Segments beginning with 1a (eastern tie-in)

The following is a summary of the advantages and disadvantages of Segments 1a+1b+3 as compared to Segments 1a+4.

- Advantages of 1a+1b+3 are as follows:
- Less costly implementation ($0.12 million less)
- Has the least wetland impacts (2.54 acres less and $76,200 lower mitigation costs)
- Less potential impact to Farmland (Prime if Drained) (0.46-acre less)
- Slightly shorter overall length (0.01-mile shorter)
- Disadvantages of 1a+1b+3 are as follows:
- Higher potential of CR impacts (0.46-acre more “High Probability” impact and 1.71 acres more “Medium Probability” impacts)

Segments beginning with 2a, 2b and 2c (western tie-in)

The following is a summary of the advantages and disadvantages of Segment 2b as compared to Segments 2a+3 and Segments 2c+3.

- Advantages of 2b are as follows:
- Slightly shorter overall length (0.12-mile shorter).
- Less costly implementation ($0.19 million less than Segments 2a+3 and $0.05 million less than Segments 2c+3)
- Lower stream impacts (15 linear feet less stream crossings than Segments 2a+3 and 40 linear feet less stream crossings than Segments 2c+3)

- Less overall potential of CR impacts (3.79 acre less "High Probability" impact than Segments 2a+3 and 1.72 acres less than Segments 2c+3; 2.72 acres less "Medium Probability" impacts than Segments 2a+3 and 9.5 acres less than Segments 2c+3)
- Less potential impact to Farmland (0.28-acre less to Prime than 2c+3 and 3.32 acres less to Prime if Drained than Segments 2a+3 and 3.54 less than Segments 2c+3)
- Disadvantages of 2b are as follows:
- Higher impact to wetlands (0.97 acres more than Segments 2a+3 and $29,100 additional mitigation costs; 7.09 acres more than Segments 2c+3 and $212,700 additional mitigation costs)
- Higher potential to impact mines (3.52 acres more than Segments 2c+3 and 5.78 acres more than Segments 2a+3)

Based on the analysis above Segments 1a+4, Segments 2a+3, and Segments 2c+3 are eliminated from further study.

Segments 6a and 6b Analysis

Segments 6a and 6b are in the southern portion of the study area, south of US 90/Chef Menteur Hwy. They are essentially parallel segments, with Segment 6a being located more easterly. Both segments begin at the northern end of Segment 5 and extend due north to meet the southern node of Segment 7. During the Phase I evaluation the segments were found to have similar potential impacts and costs; therefore, as neither segment stood out as a preferred option, it was recommended that they both be carried forward to Phase 2 for further investigation.

Segment 6a begins at the northern terminus of Segment 5, extending north between Old Lower Bay Road and ending south of US 90/Chef Menteur Hwy, for approximately 0.92-mile before connecting to Segment 7. The segment parallels a utility corridor on the east for most of its length. Potential impacts include archaeological sites and water wells, farmland, and wetlands, which includes shading impacts. Due to the location and type of wetlands crossed, some trestle-bridging is anticipated.

Segment 6b also begins at the northern terminus of Segment 5, extending north between Old Lower Bay Road and ending south of US 90/Chef Menteur Hwy, for approximately 0.92-mile before connecting to Segment 7. Similar to Segment 6a, Segment 6b parallels the same utility corridor but on the west side for most of its length. The segment impacts potential archaeological sites and water wells, farmland, and wetlands, which includes shading impacts. Due to the location and type of wetlands crossed, some trestle-bridging is anticipated.

See **Figure 3**.

Table 2 contains a side by side comparison of Segments 6a and 6b.

FIGURE 3: SEGMENTS 6A AND 6B

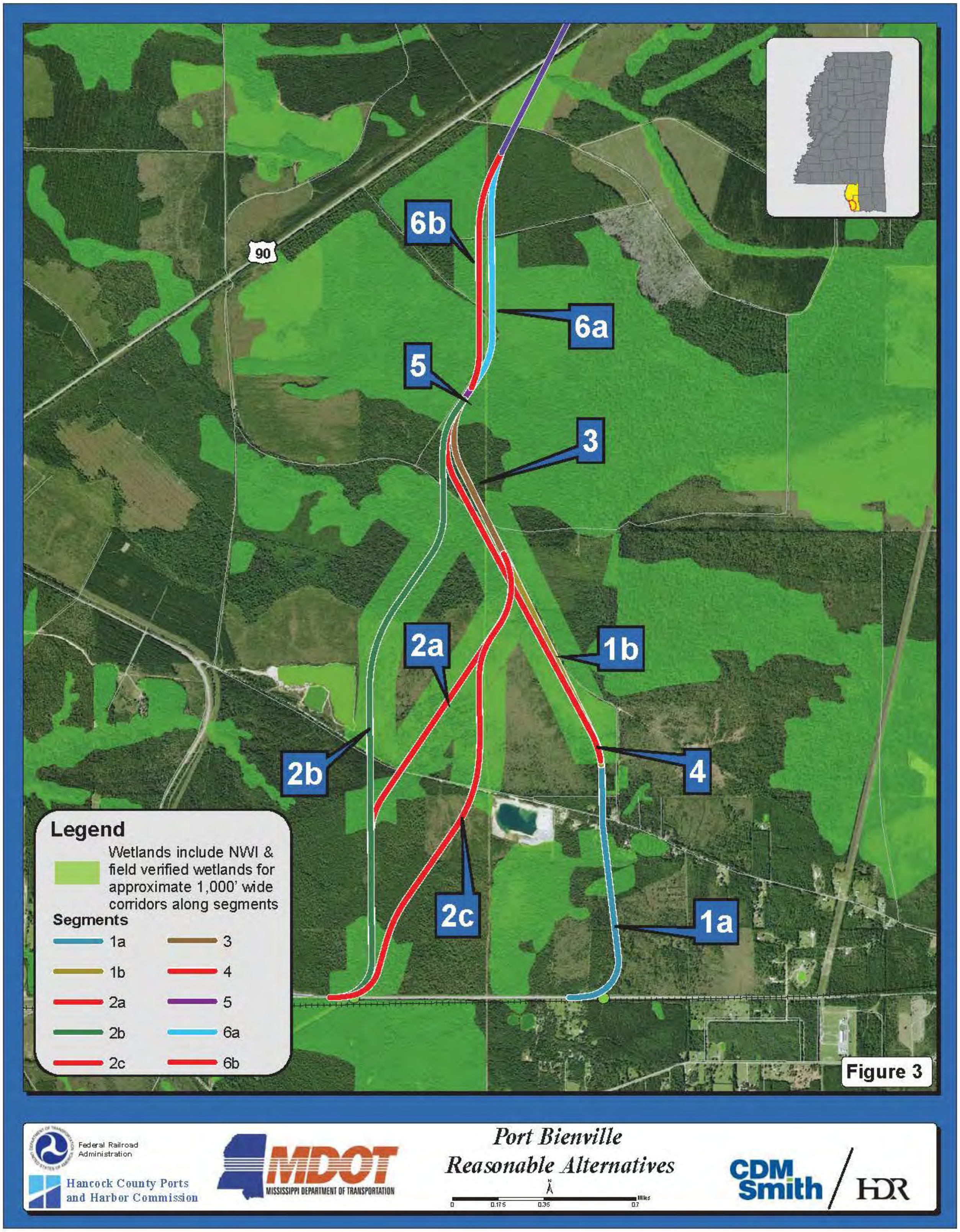


TABLE 2: COMPARISON MATRIX FOR SEGMENTS 6A AND 6B

Description	Unit of Measure	Segment	
		6a	6b
ENGINEERING CRITERIA			
Total Length	Miles	0.92	0.92
Length Utilizing the Existing NS Rail Bed	Miles	0.00	0.00
Length Utilizing the Existing PBVR east of 2a, 2b & 2c	Miles	0.00	0.00
New At-Grade Rail Crossings (Paved Roads)	# of Crossings	0	0
Est. Length of Wetland Bridging	LF	587	1,500
Total Estimated Implementation Cost **(1)**	$ Millions	$7.25	$14.47
NATURAL FEATURES			
Wetland Impacts **(2)**	Acreage	11.02	16.51
Shading Impacts	Acreage	0.20	0.52
Cost of Wetland Mitigation **(3)**	$60K per acre @ 50%	$330,600	$495,300
Proposed Texas Flat Mitigation Bank	Acreage	0.00	0.00
Cost of Mitigating Impacts to Mitigation Bank	$120K per acre @ 50%	$0	$0
Streams 303(d)/TMDL's	# of Crossings	0	0
Streams 303(d)/TMDL's	Length (miles)	0.00	0.00
Stream Crossings	# of Crossings	0	0
Total Stream Impacts	Feet	0	0
Cost of Stream Mitigation **(3)**	$200 per linear feet @ 50%	$0	$0
MAN-MADE FEATURES			
MDEQ CERCLA/Haz Mat sites	Acreage	0.00	0.00
Potential Archaeological Sites			
High Probability	Acreage	0.03	0.61
Medium Probability	Acreage	2.85	5.98
Farmland (Prime)	Acreage	0.00	0.00
Farmland (Prime if Drained)	Acreage	12.52	11.95
Farmland (Statewide Importance)	Acreage	0.00	0.00
Mines	Acreage	0.00	0.00
Bombing Ranges	Acreage	0.00	0.00
INFRASTRUCTURE			
Water Wells	Acreage	0.72	0.72
Transmission Line Crossings	#	0	0
Gas Line Crossings	#	0	0

(1) Cost Estimates updated in October 2015
(2) Wetland Impacts are based on NWI Mapping & Ground Truthing performed in the Spring 2015
(3) Cost assumes a 100 foot wide rail bed

Summary

The following is a summary of the advantages and disadvantages of Segment 6a as compared to 6b.

- The advantages of 6a are as follows:
  - Less costly implementation ($7.2 M less than 6b, approximately half the total implementation cost)
  - Less wetland impacts (6.0 acres less)
  - Less probability of overall CR impacts (0.58-acre less "High Probability" impact and 3.31 acres less "Medium Probability" impact)
  - Less wetland shading impacts (0.32-acre less)
  - Less wetland mitigation cost ($164,700 less)
  - Less length of wetland bridging (913 LF less of bridge)

- Disadvantages of 6a are as follows:
  - Higher potential for "Farmland (Prime if Drained) impacts (0.57-acre more than 6b)

Based on the analysis above, Segment 6b is eliminated from further study.

Segments 8a and 8b Analysis

Segments 8a and 8b are in the central portion of the study area, to the east of the Texas Flat Mitigation Site. They are essentially parallel segments, with Segment 8a containing a curve and being located more easterly. Both segments begin at the northern end of Segment 7 and extend northwest to meet at the southern junction of Segment 9 (See **Figure 4**). During the Phase I evaluation these segments were found to have similar potential impacts and costs; therefore, as neither segment stood out as a preferred option, it was recommended that they both be carried forward to Phase 2 for further investigation.

Segment 8a begins at the northern terminus of Segment 7, east of the proposed Texas Flat Mitigation Site, extending northwest for approximately 0.88-mile before tying into Segment 9. The segment extends northwest impacting potential archaeological sites, farmland, and pockets of wetlands. This segment extends through the central area of a former military bombing range with the potential for unexploded ordnance. Segment 8a contains a slight curve to the east that does not occur in Segment 8b, which was introduced to avoid a small wetland before it joins with Segment 9. Segment 9 continues northwesterly circumventing the Fee Area of Stennis Space Center (SSC) on its entire eastern side.

Segment 8b also begins at the northern terminus of Segment 7, east of the proposed Texas Flat Mitigation Site. It extends northwest for approximately 0.83-mile before tying into Segment 9. Similar to Segment 8a, Segment 8b extends northwest through the former military bombing range with potential impacts to archaeological sites, farmland, and wetlands.

FIGURE 4: SEGMENTS 8A AND 8B

Table 3 contains a side by side comparison of Segments 8a and 8b.

TABLE 3: COMPARISON MATRIX FOR SEGMENTS 8A AND 8B

Description	Unit of Measure	Segment	
		8a	8b
ENGINEERING CRITERIA			
Total Length	Miles	0.88	0.83
Length Utilizing the Existing NS Rail Bed	Miles	0.00	0.00
Length Utilizing the Existing PBVR east of 2a, 2b & 2c	Miles	0.00	0.00
New At-Grade Rail Crossings (Paved Roads)	# of Crossings	0	0
Estimated Length of Wetland Bridging	LF	0	0
Total Estimated Implementation Cost **(1)**	$ Millions	$2.44	$2.42
NATURAL FEATURES			
Wetland Impacts **(2)**	Acreage	8.49	10.39
Wetland Shading	Acreage	0.00	0.00
Cost of Wetland Mitigation **(3)**	$60K per acre @ 50%	$254,700	$311,700
Proposed Texas Flat Mitigation Bank	Acreage	0.00	0.00
Cost of Mitigating Impacts to Mitigation Bank	$120K per acre @ 50%	$0	$0
Streams 303(d)/TMDL's	# of Crossings	0	0
Streams 303(d)/TMDL's	Length (miles)	0.00	0.00
Stream Crossings	# of Crossings	0	0
Total Stream Impacts	Feet	0	0
Cost of Stream Mitigation **(3)**	$200 per linear feet @ 50%	$0	$0
MAN-MADE FEATURES			
MDEQ CERCLA/Haz Mat sites	Acreage	0.00	0.00
Potential Archaeological Sites			
High Probability	Acreage	2.69	2.72
Medium Probability	Acreage	12.85	10.23
Farmland (Prime)	Acreage	7.05	4.05
Farmland (Prime if Drained)	Acreage	6.61	8.98
Farmland (Statewide Importance)	Acreage	1.39	1.99
Mines	Acreage	0.00	0.00
Bombing Ranges	Acreage	21.33	20.24
INFRASTRUCTURE			
Water Wells	Acreage	0.00	0.00
Transmission Line Crossings	#	0	0
Gas Line Crossings	#	0	0

(1) Cost Estimates updated in October 2015
(2) Wetland Impacts are based on NWI Mapping & Ground Truthing performed in the Spring 2015
(3) Cost assumes a 100 foot wide rail bed

Summary

The following is a summary of the advantages and disadvantages of Segment 8a as compared to 8b.

- The advantages of 8a are as follows:
  - Less impacts to wetlands, which lowers costs (2.0 acres of fewer impacts = $57,000 less in cost)
  - Less potential for "High Probability" CR impacts (0.03-acre less)
  - Less potential for Farmland impacts, (2.37 acres less "Prime if Drained, and 0.60-acre less "Statewide Importance")
- Disadvantages of 8a are as follows:
  - Higher potential for "Medium Probability" CR impacts (2.62 acres more)
  - Higher Farmland "Prime" impacts, (3.0 acres more)
  - Higher overall impacts to former military bombing ranges (1.09 acres more)
  - Slightly longer in overall length (0.05-mile longer than 8b, due to curve)
  - Higher important cost ($20,000 more)

Based on the analysis above, Segment 8b is eliminated from further study.

Segments 10a and 10b Analysis

Segments 10a and 10b are in the northern portion of the study area approaching the town of Nicholson. These are competing segments and a comparison to each was performed during Phase 1. Both segments were found to have similar impacts and cost, based on the level of analysis performed during Phase 1. Since a clear determination of which segment was best could not be determined at that time both segments were recommended to carry forward to Phase 2 for further investigation. Both of these segments have the same beginning and ending nodes, with both beginning at the northern end of Segment 9 and ending at the southern end or beginning of Segment 11. See **Figure 5**.

Segment 10a begins at the north termini of Segment 9 and extending north crossing Texas Flat Road at a new at-grade crossing approximately 2.5 miles east of the existing at-grade rail crossing. The segment continues to extend north and then west avoiding and/or minimizing impacts to isolated pockets of wetlands and open pit mines. Segment 10a eventually connects to Segment 11 approximately 3 miles south of the Town of Nicholson. Segment 11 represents an existing NS rail line that extends from the Fee Area of SSC to the NS mainline in Nicholson.

Segment 10b begins at the north termini of Segment 9 and extends west avoiding and/or minimizing impacts to isolated pockets of wetlands. For approximately 2 miles, Segment 10b parallels a utility corridor on the south before turning north. Shortly after turning north, the segment connects to the existing NS rail line between SSC and Nicholson, and continues along this rail line for a distance of approximately 2 miles to the beginning of Segment 11. Although the existing NS rail line is in place, it has not been used in over a decade and will require maintenance and upgrade before it can be put back in service. Segment 10b would utilize the existing at-grade crossing of Texas Flat Road.

FIGURE 5: SEGMENTS 10A AND 10 B

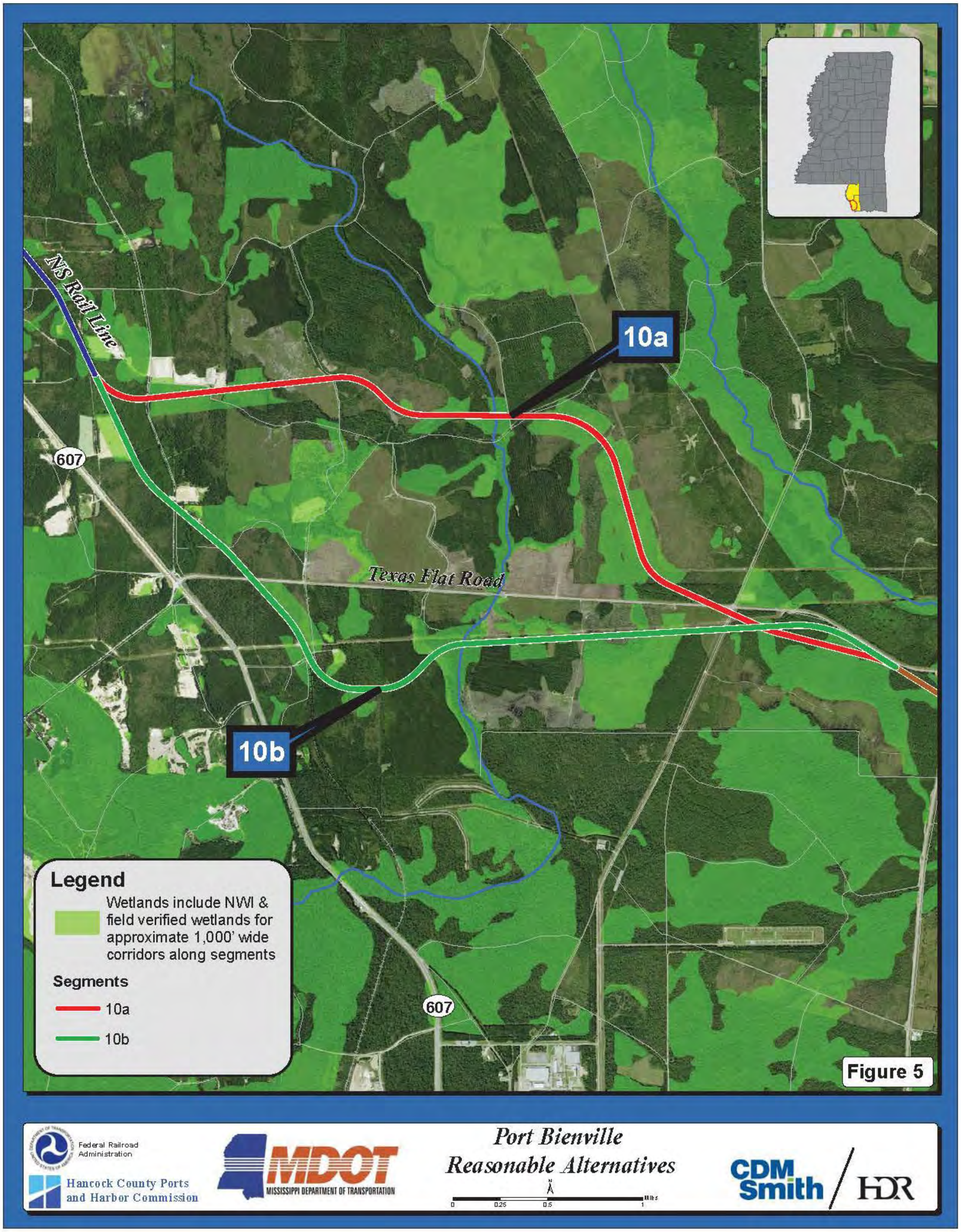


Table 4 contains a side by side comparison of Segments 10a and 10b.

TABLE 4: COMPARISON MATRIX FOR SEGMENTS 10A AND 10B

Description	Unit of Measure	Segment	
		10a	10b
ENGINEERING CRITERIA			
Total Length	Miles	4.95	5.18
Length Utilizing the Existing NS Rail Bed	Miles	0.00	1.95
Length Utilizing the Existing PBVR east of 2a, 2b & 2c	Miles	0	0
New At-Grade Rail Crossings (Paved Roads)	# of Crossings	1	0
Estimated Length of Wetland Bridging	LF	1,469	1,482
Total Estimated Implementation Cost **(1)**	$ Millions	$25.91	$23.08
NATURAL FEATURES			
Wetland Impacts **(2)**	Acreage	55.53	25.71
Shading Impacts	Acreage	0.51	0.51
Cost of Wetland Mitigation **(3)**	$60K per acre @ 50%	$1,665,900	$771,300
Proposed Texas Flat Mitigation Bank	Acreage	0.00	0.00
Cost of Mitigating Impacts to Mitigation Banks	$120K per acre @ 50%	$0	$0
Streams 303(d)/TMDL's	# of Crossings	1	1
Streams 303(d)/TMDL's	Length (miles)	0.04	0.04
Stream Crossings	# of Crossings	1	1
Total Stream Impacts	Linear Feet	202	204
Cost of Stream Mitigation **(3)**	$200 per linear feet @ 50%	$20,200	$20,400
MAN-MADE FEATURES			
MDEQ CERCLA/Haz Mat sites	Acreage	0.00	0.00
Potential Archaeological Sites			
High Probability	Acreage	20.72	29.77
Medium Probability	Acreage	74.89	60.34
Farmland (Prime)	Acreage	44.72	51.42
Farmland (Prime if Drained)	Acreage	25.80	45.23
Farmland (Statewide Importance)	Acreage	0.00	0.70
Mines	Acreage	2.34	0.84
Bombing Ranges	Acreage	23.18	24.09
INFRASTRUCTURE			
Water Wells	Acreage	0.23	1.28
Transmission Line Crossings	#	0	0
Gas Line Crossings	#	2	0

(1) Cost Estimates updated in October 2015
(2) Wetland Impacts are based on NWI Mapping & Ground Truthing performed in the Spring 2015
(3) Cost assumes a 100 foot wide rail bed

Summary

The following is a summary of the advantages and disadvantages of Segment 10a as compared to 10b.

- The advantages of 10b are as follows:
  - Has the least wetland impacts (30 acres less wetland impacts)
  - Less costly implementation ($2.83 m less)
  - Utilizes 1.95 miles of the existing NS rail bed (10a is entirely on new location)
  - Utilizes the existing at-grade rail crossing on Texas Flat Road
  - Easier potential future rail connection for SSC
  - Less potential for mine impacts (1.5 acres less)
  - Less probability of "Medium Probability" CR impacts, (14.55 acres less)
  - Less Gas Line Crossings (2 less)
- Disadvantages of 10b are as follows:
  - Slightly longer in overall length (0.23-mile longer)
  - Higher probability of "High Probability" CR impacts (9.05 acres more)
  - Higher "Farmland" impacts, (Prime - 6.7 acres more, Prime if Drained - 19.43 acres more, Statewide Importance - 0.70 acres more)
  - Slighter higher acreage in a former military bombing range (0.91 acres more)
  - Slighter higher water supply well impacts (1.05 acres more)

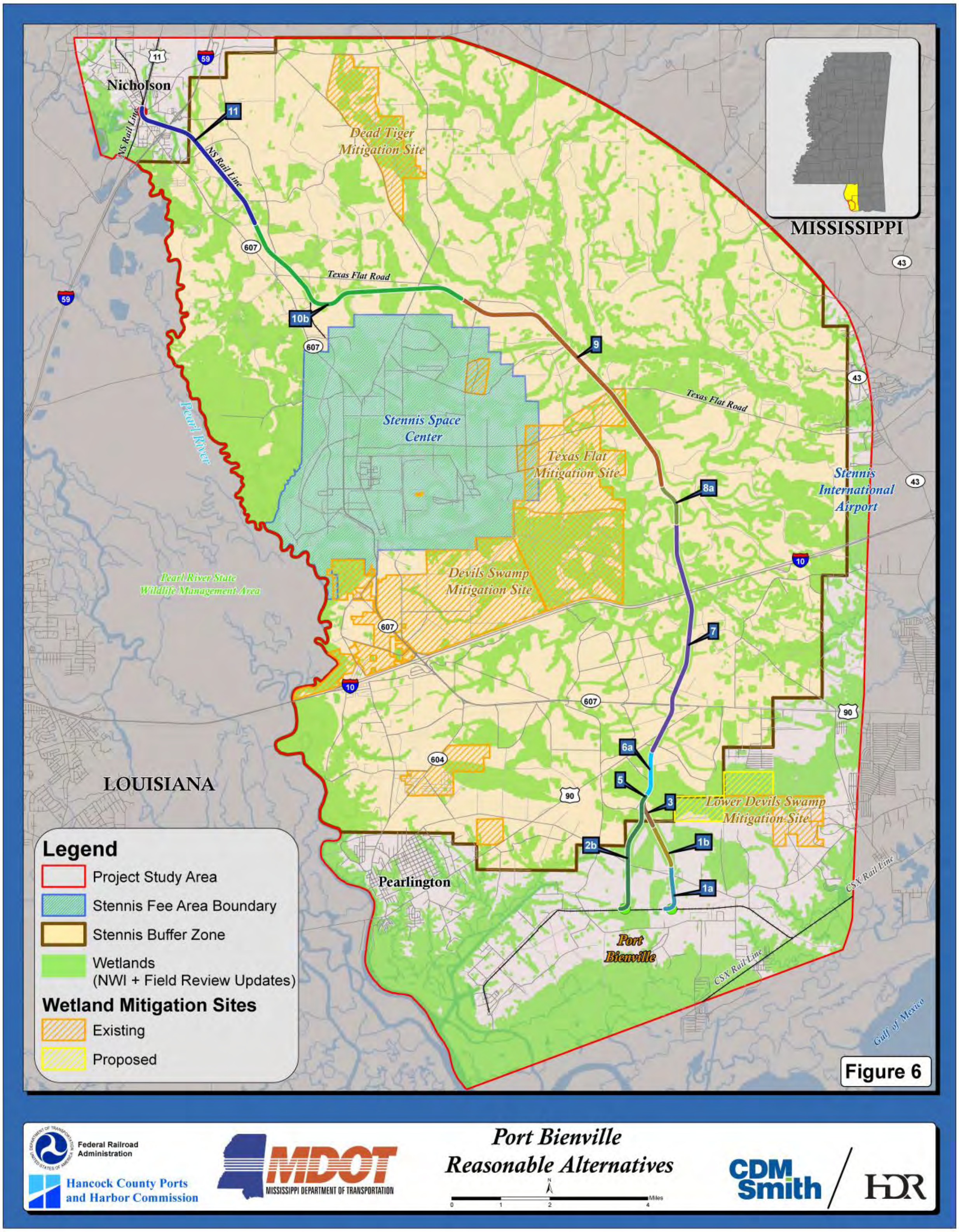
Based on the above analysis, Segment 10a is eliminated from further study.

Conclusion (Reasonable Alternatives)

Based on these segment comparisons and the elimination of segments from further study, there are 11 segments remaining, which were combined to create in two Reasonable Alternatives that will be further studied in the EIS. These two alternatives will be compared to a No-build Alternative. See **Figure 6**.

Detailed environmental, social, cultural, and physical investigations will be conducted based on the results from database searches, field investigations, and GIS analysis for the two reasonable alternatives. These investigations will be performed to identify a more detailed concept for each alternative.

FIGURE 6: REASONABLE ALTERNATIVES



Addendum to the Port Bienville Phase 2 – Southern Segment Comparison

During the months of March and April 2016, field work was completed for cultural and natural resources including wetland delineations for the majority of the proposed alignment north of I-10 and south of Segment 11(existing NS rail line). Field observations revealed the study area south of I-10 was predominantly inundated with water, most of which would be considered wetlands. Small pockets of upland areas were identified within this area but were also where residential development occurred.

Residential development in this area was observed to be sparce with the potential to be lower income properties. As stated in the Phase 1 Study Reports, the AART Tool used an avoidance and minimization approach providing the least impact corridors for consideration. However, this tool relied on existing GIS data to evaluate segments. Additionally, the ranking of the data layers was uniformly applied throughout the study area for consistency. During Phase 2 of the project development, planners, scientist, and engineers continued the alternative refinement to avoid and/or minimize impacts as new data became available. In this case, as actual wetland data became available, opportunities arose for the project team to refine the two segment routes south of I-10 to help minimize impacts.

Concerns with the Reasonable Alternatives in the South

As stated above, several key factors were identified during the intensive field surveys for the segments south of I-10. These key factors include:

- The study area below I-10 was observed to contain more wetland areas than originally anticipated;
- Upland areas tend to have residential development associated with them;
- Residential areas appear to be lower-income;
- Colonial Pipeline, has an existing utility corridor approximately 100' wide that begins near Segment 6A and travels due south to the Port Bienville Rail Road (PBVR) and beyond. This is an already disturbed corridor through this generally remote and wooded area. The utility corridor is cleared and maintained.

Using the updated information from the field surveys, the project team reassessed the two alternative options for the southern segments. These segments are identified as Segments 1a+1b+3+5+6a (Segment 1a) and 2b+5+6a (Segment 2b). One of the deciding factors in the original segment selection was wetland impacts. Because it was determined that the majority of the area is considered wetland and impacts would be equitable between all segments in the area, other resources, such as proximity to residences, became more significant in the analysis and comparison of impacts. Additionally, the project team determined that by paralleling the existing disturbed utility corridor (Colonial Pipeline) and utilizing former rail beds in the area, that potential impacts to existing residences along Old Lower Bay Road could be avoided and/or minimized.

With the intent of minimizing impacts on existing residences in the area, the project team assessed additional criteria to develop, refine and re-evaluate these southern segments.

The additional criteria included:

- Number of residential homes within 1,000 foot of the railroad centerline;
- Number of residential homes 200-400 foot of railroad centerline;
- Length of the segments paralleling the existing utility corridor;
- Length of the segments utilizing former rail beds; and
- Total length from the PBVR's switch point to the location the alignment ties into the PBVR.

Segment Refinements

Segment 1a was re-evaluated and determined that the curves in segments 3, 5, and 6a were not necessary to avoid and minimize impacts primarily to wetlands based solely on the NWI mapping. These segments were initially developed with the aid of the AART in Phase 1. Following our recent field work including the delineation of wetlands within segment 6a, 7, 8a, 9, and 10b, the NWI mapping was updated based on our field observations. It was determined that the design curves (in segments 3, 5, 6a) associated with Segment 1a are deemed unnecessary. Also, as segment 1a crosses over Old Bay Road, the alignment comes within 200 to 400 feet of four (4) single-family homes. Segment 1b also utilizes an existing former rail bed for a portion of the segment. However, the former rail bed continues in a southeasterly direction then turns south to the PBVR. Since 1a is located near the existing petroleum pipeline corridor, it briefly parallels this feature.

The project team decided that instead of modifying Segment 1a that an additional segment could be created using various parts of the original segments to assist in minimizing and reducing impacts. This new segment is identified as "D" and begins at the southern terminus of Segment 7. Segment D travel south paralleling the Colonial pipeline right-of-way on the eastern side of the corridor. The segment would utilize the former rail bed in a southeasterly direction then turning south at a point farther away from the residential development, potentially reducing impacts. This segment would also provide the greatest distance to the PBVR's switch point (See Figure A-1).

Segment 2b was also re-evaluated and determined that the curves in segments 3, 5, and 6a were also not necessary as stated above. Segment 2b was initially identified as having fewer wetlands. However, recent field efforts have revealed this to be inaccurate. It has a higher potential for wetland impacts. Segment 2b did parallel Colonial Pipeline corridor but did not utilize any of the former rail beds. Also the tie-in location to the PBVR was determined to be within 370' of the existing switch point which is very undesirable from a train operational perspective.

The project team decided that instead of modifying segment 2b that an additional segment could be created to assist in minimizing and reducing impacts near 2b. This segment is identified as "C" and begins at the southern terminus of Segment 7. Segment C would travel south paralleling the

Colonial pipeline right-of-way on the eastern side of the corridor. The segment would continue south until it approaches the sand mine located adjacent to Old Bay Road. The alignment crosses over the petroleum pipeline corridor in a southwestern direction and continues south paralleling the petroleum pipeline corridor on the western side to connect with the PBVR. This segment is the most direct route of the southern segments, and would provide a desirable tie-in distance of 0.4 miles to the PBVR's switch point which would better support their operations (See Figure A-2)

FIGURE A- 1: SEGMENT 1A AND SEGMENT D

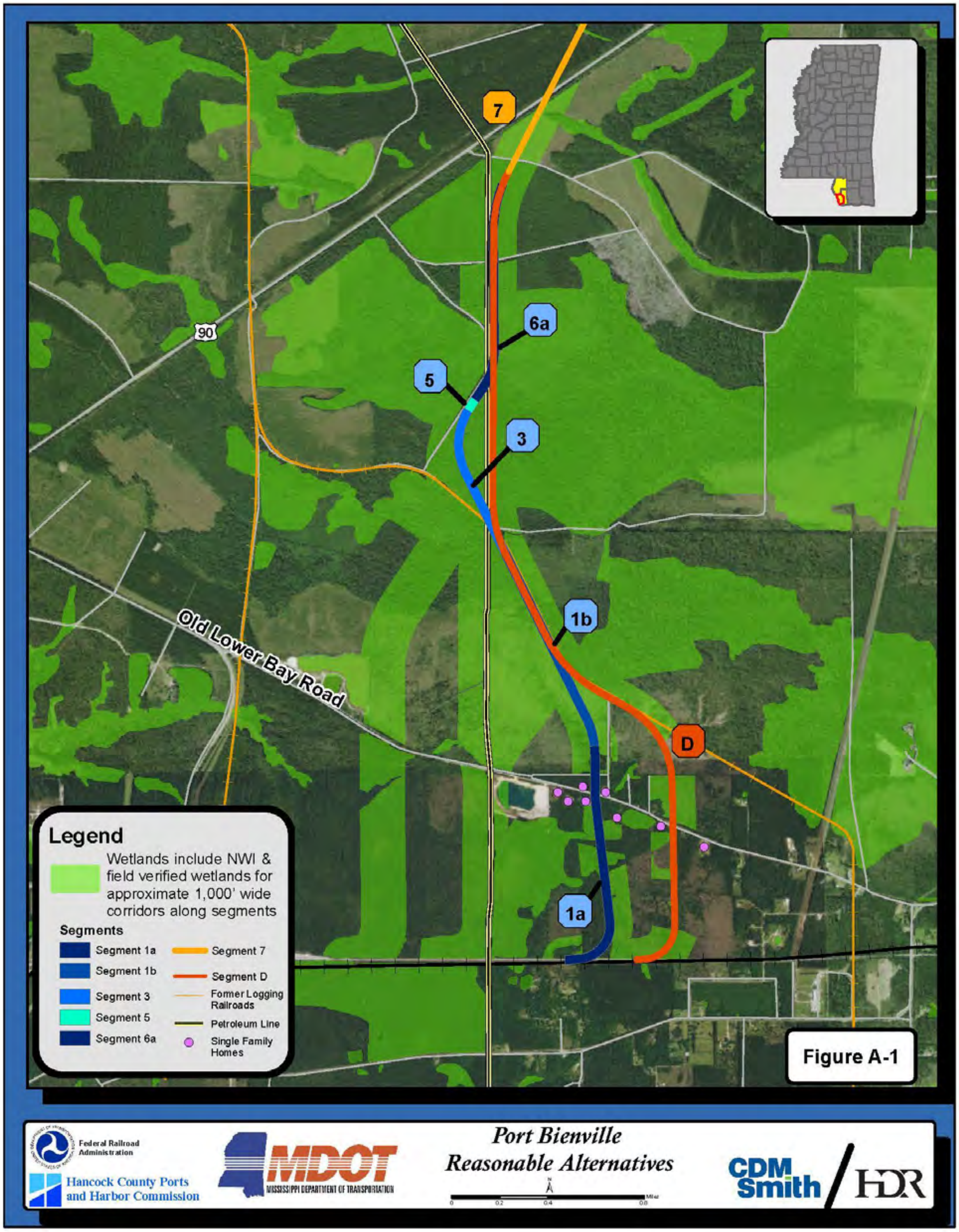
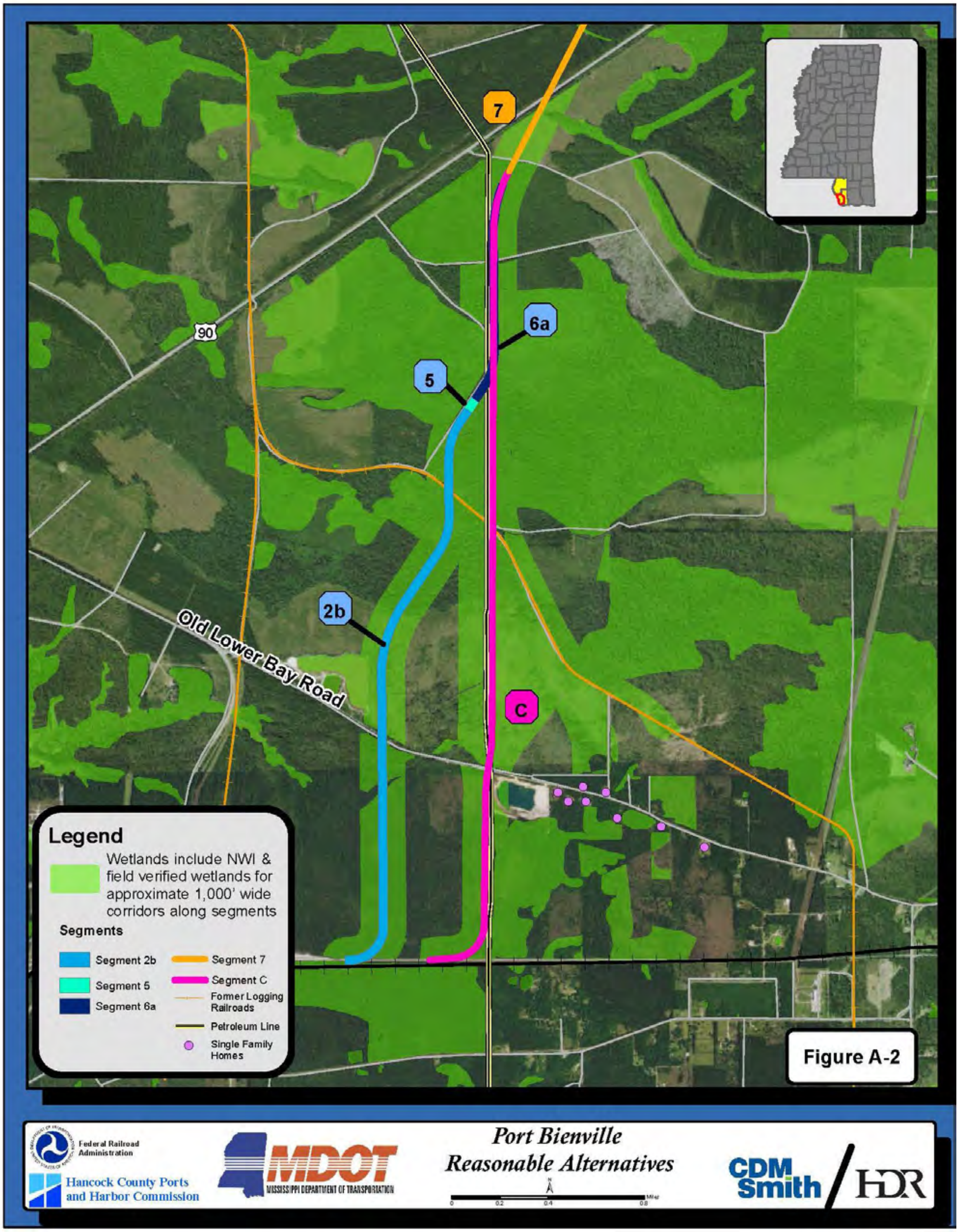


FIGURE A- 2: SEGMENT 2B AND SEGMENT C



Evaluation of the Southern Segments

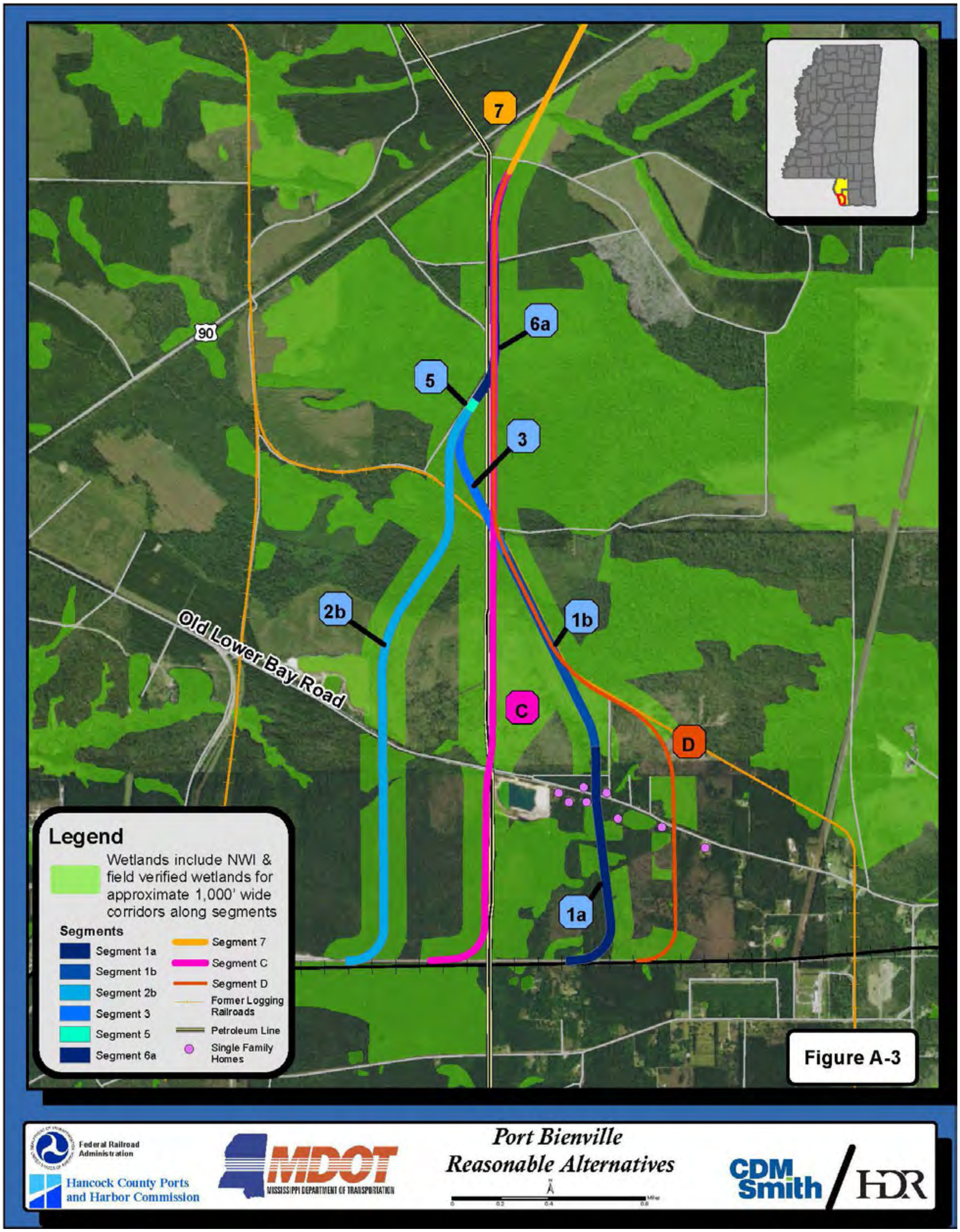
To be consistent with previous evaluations and segment comparisons, the two new segments were developed to the same standards as both segments 1a and 2b. Impact analysis was conducted on all four segments (1a, 2b, C, and D) beginning at the southern terminus of Segment 7 and ending at their individual termini along the PBVR (See Figure A-3). The project team using both old and new criteria developed an impact matrix to compare the four (4) segments as indicated below in Table A-1.

TABLE A- 1: SOUTHERN REFINED SEGMENTS COMPARISON MATRIX

Description	Unit of Measure	Segment(s)			
		Segment 1a (1a+1b+3+5+6a)	Segment 2b (2b+5+6a)	Alt C	Alt D
ENGINEERING CRITERIA					
Total Length	Miles	3.56	3.50	3.45	3.66
Length to PBVR switch	Miles	0.97	0.07	0.40	1.20
Length Utilizing Former Rail bed	Miles	0.66	0.00	0.00	0.95
Length Paralleling Existing Utility Corridor	Miles	0.61	0.61	3.04	1.23
New At-Grade Rail Crossings (Paved Roads)	# of Crossings	1	0	0	1
Estimated Length of Wetland Bridging	LF	1,300	1,300	1,300	1,300
Total Estimated Implementation Cost (1)	$ Millions	$21.61	$22.04	$21.79	$21.64
NATURAL FEATURES					
Wetland Impacts (2)	Acreage	66.85	80.80	79.27	63.46
Cost of Impacts to Wetlands (3)	$ Millions	$2.01	$2.42	$2.38	$1.90
Stream Crossings	# of Crossings	1	2	1	0
Total Stream Impacts	Feet	250	445	40	0
Cost of Impacts to Streams (3)	$200 per linear feet @ 50%	$25,000	$44,500	$4,000	$0
MAN-MADE FEATURES					
MDEQ CERCLA/Haz Mat sites	Acreage	0.00	0.00	0.00	0.00
Archaeological Sites					
High Probability	Acreage	28.11	13.85	14.09	20.07
Medium Probability	Acreage	17.89	20.45	28.08	28.77
Residential Homes within 1,000ft of centerline	Feet	6.00	0.00	0.00	2.00
Residential Homes within 200 - 400ft of centerline	Feet	4.00	0.00	0.00	1.00
16th Sections Land		0.00	0.00	0.00	1.00
Farmland (Prime)	Acreage	1.32	0.00	2.46	1.98
Farmland (Prime if Drained)	Acreage	30.90	31.47	32.51	31.08
Mines	Acreage	0.00	0.00	0.00	0.00

(1) Cost Estimates updated in May 2016
(2) Wetland Impacts are based on NWI Mapping, Delineates and field observation performed in the Spring 2016
(3) Cost assumes a 100-foot wide rail bed

FIGURE A- 3: SEGMENTS 1A, 2B, C AND SEGMENT D



Segment 1a – Compared to the other three segments this was the least cost segment. Also from an operational standpoint, it tied into the PBVR switch at an optimal distance to the switch point. It also had lower wetland impacts than two of the other segments. Segment 1a paralleled the Colonial pipeline corridor for 0.61 miles and also followed the former rail bed for 0.66 miles. However, this segment had the highest impacts to the residences in the area. The project team recommended that this segment be eliminated due to potential residential impacts, (4 residents within several hundred feet of the centerline). MDOT, HCPHC, and FRA agreed to eliminate this segment from further study.

Segment 2b – Compared to the other three segments this segment did not impact any residential areas. However, this segment had the highest wetland impacts, highest estimated costs, and highest stream impacts. Also from an operational standpoint this segment tied into the PBVR a very short distance from the switch point (370 feet). Segment 2b paralleled the Colonial pipeline corridor briefly but did not utilize any of the former rail beds. The project team recommended to eliminate this segment due to cost, highest stream crossings, and highest wetland impacts. Also from a rail operational standpoint it was the least desirable. MDOT, HCPHC, and FRA agreed to eliminate this segment from further study.

Segment C (Recommended) – Compared to the other three segments this segment is the most direct route having the shortest distance between Segment 7 and the PBVR. This segment also did not impact any residential areas. This segment fell in the median range for wetland impacts and cost and had lower stream impacts. Also from a rail operational standpoint, this segment tied into the PBVR at the optimal distance from the switch point of 0.4 mile. Segment C paralleled the Colonial pipeline corridor for the entire length of the segment.

Segment D – Compared to the other three segments this segment had the lowest estimated cost. Also from an operational standpoint tied into the PBVR's switch at an optimal distance. It also had lower wetland impacts than the other three segments. Segment D paralleled the Colonial pipeline corridor and also followed the former rail bed for over half its length. However, this segment had the potential to impact 1 to 2 residences. The project team recommended that this segment be eliminated due to potential residential impacts. MDOT, HCPHC, and FRA agreed to eliminate this segment from further study.

Summary

The following is a summary of the advantages and disadvantages of **Segment C** as compared to 1a, 2b, and D.

- The advantages of C are as follows:
  - Shortest Route
  - Follows an existing utility corridor (3.04 miles)
  - Lower cost for implementation then 2b ($0.25 m less)
  - Optimal distance to the PBVR switch.
  - No impacts to residences (Both 1a and D impact residences)

- Disadvantages of C are as follows:
  - Higher wetland impacts (2b has the highest)
  - Higher probability of "High Probability" CR impacts (D has the highest)

– Higher "Farmland" impacts, (Prime – 2.46 acres more, Prime if Drained – 32.51 acres more)

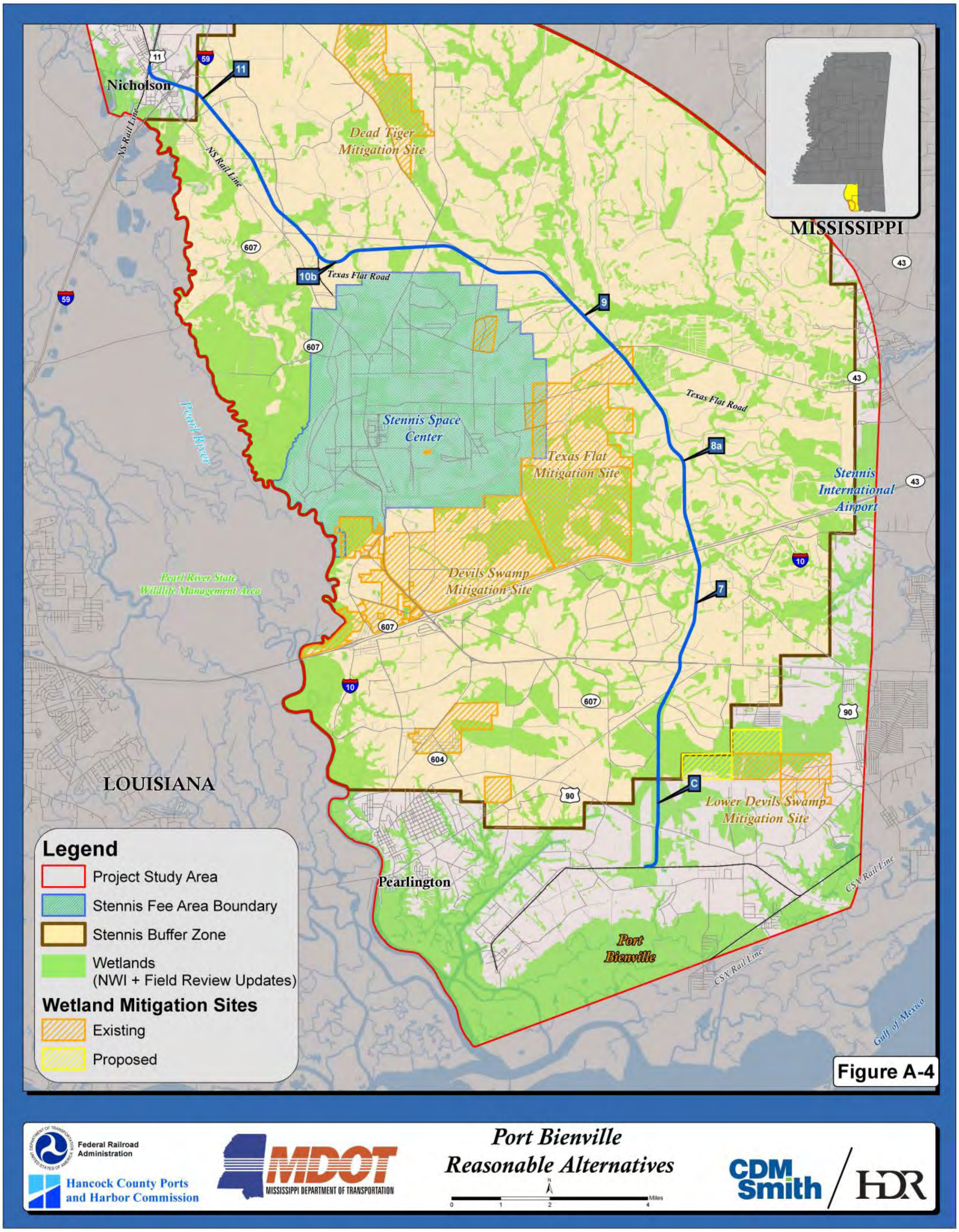
Based on the above analysis, Segments 1a, 2b, and D are eliminated from further study.

Conclusion (Recommended Segments)

Based on these segment comparisons and the elimination of segments from further study, there are 6 segments, which were combined to create the Recommended Reasonable Alternative that will be further studied in the EIS. This alternative will be compared to a No-build Alternative. See Figure A-4.

Detailed environmental, social, cultural, and physical investigations will be conducted based on the results of database searches, field investigations, and GIS analysis for the reasonable alternative. These investigations will be performed to identify a more detailed concept for each alternative.

FIGURE A- 4: REASONABLE ALTERNATIVE



cdmsmith.com

in association with HDR