Bioeconomy Development Opportunity Zone Risk Rating | BDO Zone Designation: Natchez, MS
Date of Issue: April 24, 2023
BDO Zone Rating: **'AA'**

Bioeconomy Development Opportunity Zone Risk Rating

The Natchez, MS Bioeconomy Development Opportunity Zone is rated 'AA'. There is an abundance of available woody biomass within the BDO Zone, able to accommodate bio-projects, with low risk of feedstock shortage.

'AA'

Rating Parameters:

Category	Rated Quantity	Delivered Cost	BDO Zone Size
Forest Residues	**460,000 bdt/yr**	**$100/bdt**	**100 miles ex. Natchez**
Pulpwood	**2.5 million bdt/yr**	**$58-$68/bdt**	
Sawmill Residuals	**600,000 bdt/yr**	**$77 -$94/bdt**	

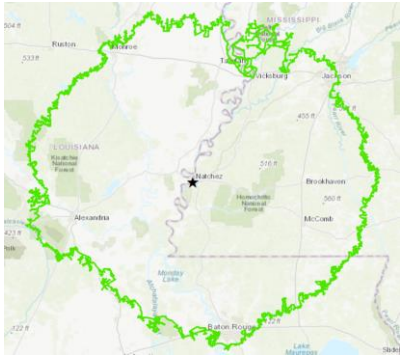
BDO Zone Assets

- **4.1 million bdt/yr of woody biomass potentially available at low-risk**
- **Strong forestry and wood industry sectors with a long history of performance**
- **Access to a large number of potential suppliers, including sawmills and logging contractors**
- **High Pulpwood growth-to-drain ratio of 2.13 for softwoods and 3.75 for hardwoods**

BDO Zone Liabilities

- **Companies representing new industries, such as SAF, Renewable Diesel, and BECCS, proposing to enter the BDO Zone**
- **Forest Residue supply chains are not developed and require capital investment to scale up**

Natchez, MS BDO ZONE



BDO Zone Risk Rating

The Natchez, Mississippi Bioeconomy Development Opportunity Zone is rated 'AA', or *very low risk*.

Risk Rating Grades are defined as follows: AA (*very low*), A (*low*), Baa (*low-moderate*), Ba (*moderate*), B (*moderate-high*), or C (*high*).

Scoring and Ratings Methodology

In assessing the biomass supply chain risk for the Bioeconomy Development Opportunity (BDO) Zone in Natchez, Mississippi, 48 Risk Indicators from the US Standards for Biomass Supply Chain Risk (BSCR) were applied. These BDO Zone Risk Indicators are the subset of BSCR Risk Indicators applicable to gauging feedstock risk within a BDO Zone.

Feedstock quantity is expressed in bone dry tons per year (bdt/yr). While feedstock cost is expressed in US dollars, delivered to proponent. Maximum transport distance is based on a 100-mile drive distance of the supply zone.

The BDO Zone rating is based on an aggregation of the scores assigned to each BDO Zone Risk Indicator (RI) assessed in this report. First, each BDO Zone Risk Indicator is given a **Raw RI** score based on the research and analysis conducted on the feedstock supply chain in the region. Raw RI Scores are scaled between 1 (*low risk*) and 10 (*high risk*).

Next, each Risk Indicator is discounted, or "notched", based on the degree to which the uncertainty drivers are deemed addressable, and whether there is a reasonable expectation that mitigation measures could be put into place within the price parameters for this rating.

The **Notched Salience score** corresponds to the likelihood of each Risk Indicator's described risk materializing given the implementation of reasonable mitigation measures. To arrive at the Notched Salience score, Raw RI scores are reduced based on the efficacy of the likely mitigation measures. If applicable, notching occurs at one of 3 levels: 25%, 50%, or 75%.

Finally, the potential impact of each Risk Indicator on the supply chain is assessed and scored on a 10-point **Impact Level** scale, as either *low (3.33), moderate (6.66), or high (9.99).* Impact level scores are based on assumptions that key measures were implemented to mitigate uncertainty drivers in the BDO Zone but failed to do so.

The **Loaded RI** score for each Risk Indicator is then calculated as the product of Notched Salience and Impact Level scores. For example, if the Risk Indicator 'Competitor Price and Price Sensitivity' is scored at a Raw Score of 4, a Notched Salience of 2, and the Impact Level is high (i.e., 9.99). The final Loaded RI score for this risk indicator is 2 × 9.99 = 19.98 (out of 100).

Loaded RI scores of 33.33 or less are deemed *low risk*; scores greater than 33.33 and less than 66.66 are deemed *moderate risk*; and those that score 66.66 to 100 are deemed *high risk*.

The total risk rating for the BDO Zone is the average of all Loaded RI scores. The BDO Zone score for Natchez, MS is ***10.58 out of 100, resulting in an 'AA' designation.*** All scoring and rationale for each Risk Indicator is provided in Appendix A. It is important to note that this assessment is evaluated *assuming* that the risk related to proposed woody biomass consuming facilities in negligible. In other words, we do not account for proposed competitors.

Analyst Notes

The forestry and wood processing industry sectors in the Natchez BDO Zone have a long history of performance, dating back to the 19th century, and are one of the major industries within the Region. The vast majority of timberlands (77 %) in the Zone are privately owned and are being properly managed in order to support the industry with feedstock availability.

Substantial quantities of unutilized woody biomass feedstock were identified within 100 miles of the Natchez BDO Zone. In fact, a **total of 6.9 million bdt/yr of potentially available woody biomass feedstock was identified**, out of which 0.6 million bdt/yr is Sawmill Residual (wood chip, sawdust, shavings, and bark/hog fuel), 0.46 million bdt/yr is Forest Residue, and 5.84 million bdt/yr is Pulpwood. *Note that to account for risk mitigation measures, the BDO Zone is rated based on 2.5 bdt/yr of Pulpwood.*

In terms of suppliers, 24 sawmills were identified within the Zone, as well as numerous logging companies and harvesting contractors.

It is estimated that identified sawmills generate over 1.2 million bdt/yr of Sawmill Residuals, but to stay conservative in our assessments, we assumed that the proponent can potentially secure 50 % of generated fiber, as some of the residuals are currently under contract. However, sawmills are typically open for business and are ready to divert supplies when contracts expire if the price is attractive.

Loggers within the zone harvest almost 4 million bdt of Pulpwood per year. Logging is a well-developed local industry but might require a certain level of scaling up if the demand for Pulpwood rises. However, loggers are usually ready to invest in new equipment as long as longer-term contracts are in place.

Forest Residue is a by-product of timber harvesting operations and is estimated to be generated at a rate of 1.84 million bdt/yr within the Natchez BDO Zone. Based on a conservative industry standard capture rate of 25%, we estimate that a minimum of 460,000 bdt/yr of Forest Residue is potentially available in the BDO Zone.

We identified 20 facilities located within a 200-mile driving distance of Natchez that utilize woody biomass, primarily pulp mills and pellet mills. As the estimates provided in this report indicate quantities potentially available in addition to current consumption, the existence of a well-developed market for woody biomass is a positive indicator. This shows that the woody biomass supply chain is well-established, and the industry is healthy.

Softwood Pulpwood removals in the region have historically been stable, with a slight increase from 5.4 in 2009 to 6.2 million bdt/yr in 2020. Hardwood Pulpwood removals dropped from around 2 million bdt/yr in 2009 to 1.7 million bdt/yr in 2020.

The growth-to-drain ratio is a key indicator of the sustainability of roundwood utilization. This ratio is calculated by dividing the annual net growth by removals, and a ratio of 1.2 is generally regarded as the minimum sustainable level. For instance, a ratio of 1.5 implies that 50% of roundwood is added to the forestland every year. In 2020, the growth-to-drain ratios for softwood and hardwood Pulpwood were 2.13 and 3.75, respectively. These high growth-to-drain ratios suggest that there is ample room for additional Pulpwood consumption.

The delivered pricing for Sawmill Residuals within the BDO Zone ranges from $77.60 to $93.40 per bdt, while the delivered pricing for Pulpwood ranges from $58.64 to $64.66 per bdt. Forest Residue is estimated to have a delivered price of approximately $100 per bdt to the facility[1]. Historically, in real terms, the pricing of woody biomass has been decreasing in the past decade, likely a consequence of lower demand and higher supplies.

Salient Risk Indicators

We have identified the demand for competitors' products as the most significant risk to the woody biomass supply chain. While we do not anticipate a surge in demand for pulp and paper, there is likely to be a short-term rise in demand for wood pellets. Additionally, the development of new renewable fuels industries, such as Sustainable Aviation Fuel, Renewable Diesel, Renewable Hydrogen, and Bio Energy with Carbon Capture and Storage (BECCS), is currently underway. These markets are being propelled by climate change-related policies and have the potential to consume significant amounts of woody biomass if developed within the BDO Zone.

The majority of potentially available woody biomass exists in the form of Pulpwood or Forest Residue. Our estimates rely on the USDA's Forest Inventory and Analysis (FIA) tool as well as industry-standard methodologies. Nevertheless, it's important to note that these models come with a certain degree of inherent error and should be considered high-level estimates. However, the risk of model inaccuracy is mitigated by the abundance of Pulpwood and Forest Residue in the BDO Zone.

Sawmill Residuals and Pulpwood have a well-established history of extensive utilization, which has facilitated the development of their respective supply chains. In contrast, Forest Residue has not traditionally been used in significant quantities, so the Forest Residue supply chain requires time to scale up. However, any new bio-project is likely to utilize Pulpwood and Forest Residue simultaneously, effectively mitigating the risk of low historical demand for Forest Residue in the BDO Zone.

Suppliers of Sawmill Residual are subject to the same external risk factors, such as downturns in housing markets, as well as natural disasters such as droughts and floods. These factors can impact the availability of Sawmill Residuals, albeit not significantly. Again, this risk is mitigated by a large surplus of Pulpwood and Forest Residue.

Long-term weather and climate trends pose a risk in the BDO Zone. Floods and drought in the Natchez BDO Zone are likely to become more severe in the future. Wildfires and hurricanes also constitute threats to feedstock supply chain management within the Zone, as they can destroy inventory and bring transportation to a temporary halt.

Infrastructure Asset Profile

Natchez's infrastructure assets were scored on a scale of 0–10, with scores defined as follows: 0 (very good), 2 (good), 4 (reasonable), 6 (fair), 8 (poor), and 10 (insufficient). Among the top-rated assets are Land Parcel, Industrial Land Use, Highway Access, River Access, Railway Service, Airport Accessibility and Housing Availability.

Overall, Natchez, MS, presents a profile of positively rated infrastructure assets, with an average score of 1.96 out of 10. This score supplements Natchez's BDO Zone rating and supports its low-risk designation. The full infrastructure asset profile is detailed in Table 2.

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[1] Note that the pricing this BDO Zone is rated for is valid at current demand levels. New significant demand, such as a new SAF plant, would likely increase rated feedstock price.

Figure 1 - Risk Indicators (Sorted by Risk Level)

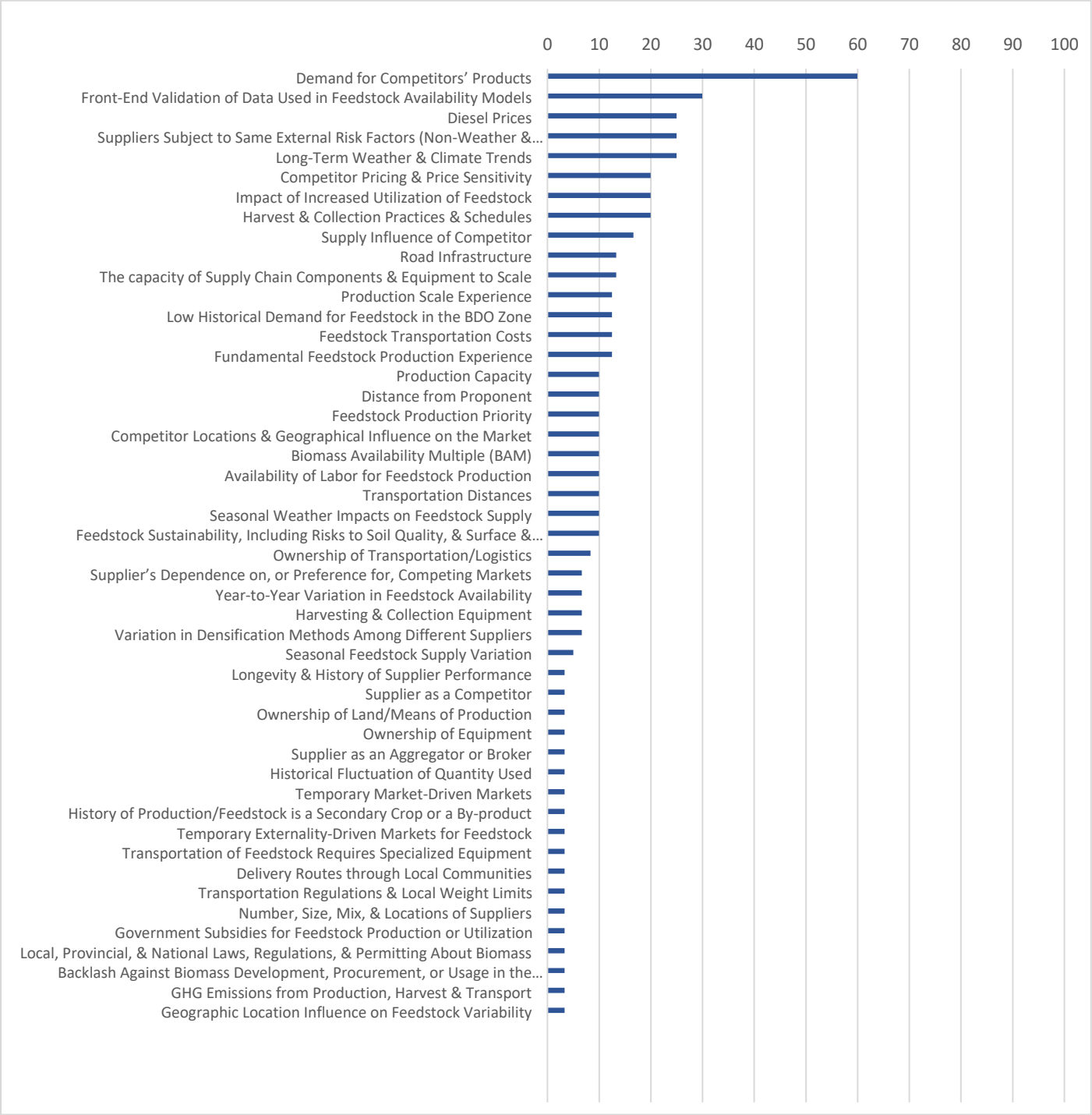


Table 1 - Risk Indicators

Feedstock Supply Chain Risk Indicators	Raw RI Score	Notched Salience	Impact Level	Loaded RI Score
Category 1: Supplier Risk				
Longevity & History of Supplier Performance	1	1	3.33	3.33
Production Capacity	1	1	9.99	9.99
Supplier's Dependence on, or Preference for, Competing Markets	2	2	3.33	6.66
Supplier as a Competitor	1	1	3.33	3.33
Ownership of Land/Means of Production	1	1	3.33	3.33
Ownership of Equipment	1	1	3.33	3.33
Ownership of Transportation/Logistics	5	1.25	6.66	8.32
Supplier as an Aggregator or Broker	1	1	3.33	3.33
Distance from Proponent	1	1	9.99	9.99
Fundamental Feedstock Production Experience	5	1.25	9.99	12.48
Production Scale Experience	4	1.25	9.99	12.49
Feedstock Production Priority	4	1	9.99	9.99
Category 2: Competitor Risk				
Competitor Locations & Geographical Influence on the Market	1	1	9.99	9.99
Historical Fluctuation of Quantity Used	1	1	3.33	3.33
Competitor Pricing & Price Sensitivity	4	2	9.99	19.98
Supply Influence of Competitor	5	2.5	6.66	16.65
Temporary Market-Driven Markets	1	1	3.33	3.33
Demand for Competitors' Products	8	6	9.99	59.94
Category 3: Supply Chain Risk				
Biomass Availability Multiple (BAM)	1	1	9.99	9.99
Impact of Increased Utilization of Feedstock	2	2	9.99	19.98
Seasonal Feedstock Supply Variation	3	1.5	3.33	4.99
Year-to-Year Variation in Feedstock Availability	1	1	6.66	6.66
Front-End Validation of Data Used in Feedstock Availability Models	6	3	9.99	29.97
Low Historical Demand for Feedstock in the BDO Zone	5	1.25	9.99	12.49
History of Production/Feedstock is a Secondary Crop or a By-product	1	1	3.33	3.33
Diesel Prices	5	3.75	6.66	24.98
Harvest & Collection Practices & Schedules	6	3	6.66	19.98
Harvesting & Collection Equipment	2	2	3.33	6.66
Temporary Externality-Driven Markets for Feedstock	1	1	3.33	3.33
Variation in Densification Methods Among Different Suppliers	2	2	3.33	6.66
Availability of Labor for Feedstock Production	6	1.5	6.66	9.99
Feedstock Transportation Costs	5	3.75	3.33	12.49
Transportation Distances	3	1.5	6.66	9.99
Transportation of Feedstock Requires Specialized Equipment	1	1	3.33	3.33
Delivery Routes through Local Communities	1	1	3.33	3.33
Transportation Regulations & Local Weight Limits	1	1	3.33	3.33
Road Infrastructure	2	2	6.66	13.32
Number, Size, Mix, & Locations of Suppliers	1	1	3.33	3.33
Suppliers Subject to Same External Risk Factors (Non-Weather & Equipment Based)	5	2.5	9.99	24.98
Seasonal Weather Impacts on Feedstock Supply	3	1.5	6.66	9.99
Long-Term Weather & Climate Trends	5	2.5	9.99	24.98
Government Subsidies for Feedstock Production or Utilization	1	1	3.33	3.33
Local, Provincial, & National Laws, Regulations, & Permitting About Biomass	1	1	3.33	3.33
Backlash Against Biomass Development, Procurement, or Usage in the Region	1	1	3.33	3.33
Feedstock Sustainability, Including Risks to Soil Quality, & Surface & Groundwaters	1	1	9.99	9.99
GHG Emissions from Production, Harvest & Transport	1	1	3.33	3.33
Geographic Location Influence on Feedstock Variability	1	1	3.33	3.33
The capacity of Supply Chain Components & Equipment to Scale	4	2	6.66	13.32
Total Composite Loaded Risk Score				**10.58**

Table 2 – Infrastructure Asset Evaluation

Infrastructure Assets	Overview	Score
Category 1: Physical Infrastructure		
1.1 Land Parcel	Natchez has an ideal land parcel of approximately 13.2 square miles (8384 acres).	1
1.2 Industrial Land Use Zone	Natchez has four industrial sites located near the Mississippi river (1) 214 acres Belwood site located on River Terminal Road; (2) 37.65 acres Majorca site located adjacent to River Terminal and Port road; (3) 270 acres Mississippi River Energy Complex located at Carthage Point Road; and (4) Riva Ridge site located near to Lower Woodville road.	1
1.3 Natural Gas Line	The sites have 12" or 22" Natural Gas Line provided by Atmos Energy (See *App. B*).	2
1.4 Electrical	Electrical is provided by Entergy and the sites have 138/115 kV transmission line and 12.47/13.8 kV distribution line (See *App. B*).	2
1.5 Fresh Water Supply Line	Natchez water works provides 25 MM GPD well water; 8" water line (See *App. B*).	2
1.6 Sewage Disposal	The Belwood site and Mississippi River Energy Complex have a 42 MGD Wastewater treatment; and Riva Ridge site has a 30 MGD WWTP operated by the Natchez Water Works (See *App. B*).	2
1.7 Drainage	Natchez is located along the Mississippi River and its tributaries, so natural drainage plays a significant role in managing stormwater runoff. Also, other infrastructure components such as storm sewers, culverts, ditches and floodplains are used to manage the run off efficiently.	2
1.8 Stormwater Management	The stormwater drainage system in Natchez consists of a network of pipes, culverts, infiltration systems, detention basins, floodwalls, and levees to manage the stormwater runoff efficiently.	2
1.9 Available ICT (Information & Communication Technology) Services	Broadband and telecommunication are provided by Cable one, Bellsouth etc..	2
1.10 Landfill/waste disposal	The City of Natchez owns and operates a landfill that is located on St. Catherine Street. The landfill is permitted by the Mississippi Department of Environmental Quality and accepts household and commercial waste from Natchez and surrounding areas. Also, Natchez has a curbside recycling program accepting paper, cardboard, plastic, aluminum and other materials.	2
Category 2: Logistics		
2.1 Highway Access and Intersection	The Industrial sites in Natchez are located close to major highways, including U.S. Highway 61, which runs north-south through the city, and U.S. Highway 84, which runs east-west, connecting Interstates 55, 20, 10 and 49. These highways provide access to other cities and destinations in the region. The driving distances from neighboring cities to Natchez are as follows- 15 miles from Vidalia, Louisiana; 33 miles from Ferriday, Louisiana; 40 miles from Woodville, Mississippi; 70 miles from Brookhaven, Mississippi; 85 miles from Jackson, Mississippi; 90 miles from Baton Rouge; 100 miles from Mc Comb, Mississippi; 115 miles from New Orleans, Louisiana; 170 miles from Lake Charles and 200 miles from Shreveport.	1
2.2 Ocean/River Access	Natchez is located along the Mississippi River, which is a major waterway in the United States. The Mississippi River provides access to ports and other cities along its length, and is used for commercial navigation and transportation. The industrial sites are located close to the Natchez-Adams County Port, which is capable of handling wet, dry, and crane services for barge including containers on barge. Also, a new port "Port of Vidalia" has been proposed across the river. The nearest seaport is the Port of Baton Rouge located in Louisiana, which is about 121 miles from Natchez. Additionally, the Port of New Orleans located in Louisiana is about 133 miles from Natchez, and is connected to the Gulf of Mexico by the Mississippi River. The nearest ocean access is the Gulf of Mexico, which is approximately 160 miles to the south.	1

2.3 Accessibility to Airport	The industrial sites are located 6 miles from Natchez-Adams County Airport; 40 miles from Concordia Parish Airport; 68 miles from Jackson-Medgar Wiley Evers International Airport; 100 miles from Alexandria International Airport; 121 miles from Baton Rouge Metropolitan Airport and 125 miles from New Orleans Louis Armstrong International Airport.	1
2.4 Railway Service	The industrial sites have railway services that connect the port facilities and serve as a connection to the CN mainline in Brookhaven. There is also a proposed rail spur near the Riva Ridge site. Natchez is served by Canadian National Railway operating a rail line that runs through Natchez, providing freight rail service to the area. The rail line connects Natchez to other cities in the region and beyond, allowing the transportation of goods and commodities by rail. There are also several other freight rail companies that operate in the region, including Kansas City Southern Railway and Norfolk Southern Railway, although they do not have rail lines that directly serve Natchez. However, they do serve nearby cities such as Brookhaven and Jackson, which are within a reasonable distance of Natchez. Some of the passenger railway stations close by are- Natchez Train Station, Vidalia Amtrak Station and Baton Rouge Amtrak Station.	1
2.5 Logistics - Construction	Natchez has good labour force to manage construction projects seamlessly.	2
Category 3: Social Infrastructure		
3.1 Quality of Life	Natchez has a livability score of 58/100, as compared to 65 in Mississippi, and 67 in the U.S. The cost of living in Natchez is 5% higher compared to other cities in Mississippi but is 14% less expensive than the US average. Natchez is ranked #285 in Mississippi and #24,591 in the U.S.	3
3.2 Education	The Natchez-Adams School District operates ten public schools in the area. There are also three private or parochial schools that cover pre-school through twelfth grade. The graduation rate of high school is 82%, 7% higher than Mississippi and is 1% lower than the US average. Examples of the higher educational institutions serving the community are as follows: Copiah-Lincoln Community College is 32 miles; Alcorn State University is 46 miles; Louisiana State University at Alexandria is 79 miles; Mississippi College is 82 miles; Louisiana College is 84 miles and Tougaloo College is 87 miles.	2
3.3 Local Retail	Adams County serves as a regional hub for shopping and retail in the Natchez area and surrounding counties in Louisiana. Natchez has multiple retail outlets, food chains, convenience stores, restaurants, local groceries, etc.	2
3.4 Culture and Recreation	Natchez has a rich cultural heritage and several historic sites including the William Johnson House and the Melrose Estate. The Natchez Opera Festival and the Natchez Festival of Music are two major annual events in the region. The community also offers many facilities- community parks, swimming, playgrounds, golf courses, sportsplex, hiking trails, lakes, woodlands, hunting, fishing, paddling, etc.	2
3.5 Hospital and Doctors	There are several hospitals and health clinics providing quality medical care. Merit Health Natchez is a 179-bed facility that offers a range of medical services, including emergency care, diagnostic services and outpatient surgery with a patient to primary care physician ratio of 1,114 to 1. The closest hospitals are Adams County Medical Center and River Region Medical Center. Other hospitals near Natchez are follows- Merit Health River Oaks is 39 miles; St. Dominic Hospital is 70 miles and Baton Rouge General Medical Center is 115 miles.	2
3.6 Housing Availability	According to United States Census Bureau 2021, the median value of a housing unit in Natchez is $99,300, which is 6% lower than Mississippi, and 46% lower than the US average. The median gross rent is $579, which is 39% lower than the US average. Also, 76.77% of houses are occupied and 23.23% are vacant in the region with a homeownership rate of 57.2%, slightly below the national average of 64.4%.	1

3.7 Crime Rate	The total crime is 116%, which is 112% higher than Mississippi. However, the crimes reported in Natchez have been declining at a rate of 3% to 4% per year for the last eight years.	6
Category 4: Workforce		
4.1 Labour Rates	The federal minimum wage for 2022 is $7.25 per hour in the US. However, some cities in Mississippi have set a higher minimum wage, so it's possible that the minimum wage in Natchez may be higher than the federal minimum wage of $7.25 per hour based on the employer.	2
4.2 Employment Rates	According to United States Census Bureau 2021, the median household income is $ 30,082, which is 26% lower than Mississippi, and 46% lower than the US. The Income per capita is $19,078, which is 36% lower than the US average.	3
4.3 Available Skilled Labour	There is an abundance of highly skilled professionals across all industries. Major occupations in the region include – Health Care & Social Assistance (918); Retail Trade (614); Educational Services (595); Office & Administrative Support (520); Sales & Related Occupations (445). Also, the attainment of high school diploma is 19.4%, Bachelors is 10.3% and Masters is 4.39% in the region.	2
4.4 Available Unskilled Labour	There is a good availability of unskilled labour especially general laborers, production and retail workers.	2
4.5 Workforce- Size	According to United States Census Bureau 2021, Natchez has a total labour force of 10,892; with an employment rate of 90.59%, and an unemployment rate of 9.30%. The median age in the region is 42, with approx. 1736 people between the age of 20 to 64.	2
	Total	***1.96***



Bioeconomy Development Opportunity Zone Rating Independent Review Committee – Natchez, MS

Chandler Russ, Natchez, Inc.

Thomas McElroy, Cooperative Energy

Jerry Lyles, HJ Hines Trucking

Lance Coe, Atmos Energy

Connor House, Good Hope Timber

Jack Stephens, Stephens Management Inc.

Sim Mosby, Silas Simmons

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Tedrick Ratcliff, CLAW Forestry

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APPENDIX A: RISK INDICATOR SCORING METRICS

CATEGORY 1: SUPPLIER RISK

1.1. Longevity & History of Supplier Performance

Rationale: Number of years in business is a positive indicator of future solvency. Historical performance is an indicator of future performance.	
Raw RI Score: The BDO Zone region encompasses a significant portion of southwest Mississippi and central and eastern Louisiana, with Natchez being located directly on the Mississippi/Louisiana border. Forests cover approximately 61% of the land in Mississippi and 50% in Louisiana, with the Mississippi/Louisiana region averaging 56% of forest coverage. Mississippi is home to the largest privately owned timberland in the United States, with 77% of timberland being under private ownership. The state is also ranked number one in the nation for Certified Tree Farmers under the American Tree Farm System. In the early 20th century, Louisiana was one of the top three lumber-producing states in the US. Despite the consolidation of numerous wood processing facilities into larger companies over the years, the industry remains visible and is primarily supplied by reforested and properly managed forests in central Louisiana. The BDO Zone Region boasts over 20 fairly large sawmills, some of which have been in operation for more than a century, with several dating back to the early to the mid-20th century. Raw RI Score is 1 out of 10.	**Score 1**
Notched Salience: No adjustment. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk.	**Score Unnotched**
Impact Level: RI Impact level is deemed *low*.	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 3.33**

1.2. Production Capacity

Rationale: Supplier production capacity can be a strong indicator of long-term credit worthiness and future solvency. Higher production capacities denote strength of operational elements, including cash flows, which are important to future solvency.	
Raw RI Score: **Sawmill Residuals:** The Natchez BDO Zone is home to a substantial sawmill industry, with 24 fairly large sawmills operating in the area. Currently, these sawmills produce an estimated 1,254,961 bone dry tons per year (bdt/yr) of Sawmill Residuals within the Zone. If a new operator can access	**Score 1**

the fiber and offer satisfactory pricing, we estimate that approximately 627,481 bdt/yr of Sawmill Residuals could potentially be available, assuming a capturable rate of 50%[2].

The breakdown of potentially available residual types are as follows: bark at 126,712 bdt/yr, sawdust at 155,062 bdt/yr, and wood chip at 345,707 bdt/yr. These residuals present a significant opportunity for a new operator looking to enter the market and leverage the available resources in the Natchez BDO Zone. Of note, sawmills co-located with pellet mills would not have any residuals available for the project, as all residuals would be consumed by the pellet mill.

Forest Residuals: In the Natchez BDO Zone, several logging companies generate approximately 1.84 million bone dry tons per year (bdt/yr) of Forest Residue. However, not all of this Forest Residue can be feasibly acquired by a proponent. Therefore, assuming a capture rate of 25%, it is estimated that approximately 460,000 bdt/yr of Forest Residue may be available to a new bio-project.

Pulpwood: In the Natchez BDO Zone, loggers and harvesting companies harvested almost 4 million bone dry tons per year (bdt/yr) of Pulpwood as of 2020. Softwood accounted for 3.1 million bdt/yr, while hardwood accounted for 0.9 million bdt/yr. After removals, potentially 5.84 million bdt/yr of unutilized (growth less removals) Pulpwood is available, with softwoods accounting for 3.49 million bdt/yr and hardwoods accounting for 2.35 million bdt/yr. It should be noted that these quantities are based on private timberlands. There could be as much as 476,000 bdt/yr of Pulpwood available from public forests. Detailed charts providing further information on this data can be found in Appendix C.

Raw RI Score is 1 out of 10.

Notched Salience: No adjustment.	**Score Unnotched**
Impact Level: RI Impact level is deemed *high*.	**Score 9.99**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 6.66.	**Score 9.99**

1.3. Suppliers' Dependence on, or Preference for, Competing Markets

Rationale: Suppliers may have a vested interest in or preference for supplying specific competitors for biomass feedstock. Preferences may be due to historical, long-term, or personal relationships, less stringent feedstock quality requirements, more flexible operating hours by competing markets, or suppliers' dependences on competing markets to accept or purchase other products/by-products. Consequently, during periods of feedstock shortage, such suppliers may be more likely to allocate the scarce supply to a competitor, resulting in supply disruptions for the Proponent.

[2] This rate is based on direct feedback from sawmills in the BDO Zone.

Raw RI Score: In the Natchez BDO Zone, our research identified 20 active competitors for feedstock. The vast majority are pulp mills, with a smaller number of wood pellet mills and OSB mills. However, these competitors only source a portion of their feedstock from the BDO Zone and therefore will have a limited impact on feedstock supply. Furthermore, a significant number of sawmills in the BDO Zone have confirmed the availability of project-ready feedstock. The remaining sawmills have their residuals under short-term contracts, that could potentially become available they expire. Our research and outreach indicate that suppliers are open to business and ready to negotiate pricing, meaning that the feedstock can likely be accessed if the right price is offered. Finally, due to a large surplus of Pulpwood and Forest Residue within the BDO Zone, the risk of shortage to is deemed low. Meaning that, the supply should not be endangered by any suppliers' preference for competing markets. These factors suggest that a stable supply of feedstock is available for a new operator looking to enter the market in the Natchez BDO Zone. Raw RI Score is 2.	**Score 2**
Notched Salience: No adjustment.	**Score Unnotched**
Impact Level: RI Impact level is deemed *low.*	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 6.66.	**Score 6.66**

1.4. Supplier as a Competitor

Rationale: The risks of feedstock costs going up and availability going down increase if a supplier is also a competitor to the Proponent. In times of feedstock shortage, the risk that supply commitments will not be met increases.	
Raw RI Score: **Sawmill Residuals:** Although some sawmills in the Natchez BDO Zone use a portion of their Sawmill Residuals (mainly sawdust and bark) as fuel for internal operations, a significantly larger portion of these residuals are left unutilized and potentially available for sale. In fact, more than half of the identified sawmills in the BDO Zone have confirmed the availability of project-ready feedstock in the form of wood chips, sawdust, shavings, and/or bark. The remaining responding sawmills have Sawmill Residuals under short-term contracts, potentially making these residuals available for sale once they expire. Furthermore, some pulp and paper mills, considered competitors for feedstock, have offered surplus bark availability, suggesting a general surplus of this type of feedstock. These factors indicate a stable and potentially abundant supply of Sawmill Residuals available for a new operator looking to enter the market in the Natchez BDO Zone.	**Score 1**

Forest Residues and Pulpwood: In the Natchez BDO Zone, suppliers typically do not act as potential competitors for Forest Residue and Pulpwood, despite the fact that some competitors, such as pulp mills, may conduct their own logging for their operations. However, these competitors still tend to source their Pulpwood from loggers on the market.

In general, there are relatively few markets for Pulpwood, and as such, we assume that there should be no risk in terms of securing available Pulpwood. As for Forest Residue, demand is even lower, and very little Forest Residue is currently being collected.

Raw RI Score is 1 put of 10.

Notched Salience: No adjustment.	**Score Unnotched**
Impact Level: RI Impact level is deemed *low.*	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 3.33**

1.5. Ownership of Land/Means of Production

Rationale: Suppliers that own land where feedstock is produced, or a production facility, tend to have better control of supply chains and present lower degrees of supply risk.	
Raw RI Score: In the Natchez BDO Zone, suppliers utilize different approaches to supply feedstock, including (but not limited to) managing timberland and contracting logging companies for harvesting operations, owning the timberland and operating the harvesting equipment, and buying timber from non-industrial owners and selling it to the end consumer. Despite these various approaches, historical data shows that harvested quantities are continually stable from year to year, indicating that the system functions properly and should not pose a significant risk to the supply chain, even with the introduction of new projects. This is due to the abundance of available feedstock and often the lack of market for the same. In terms of sawmills, they manage their own productions, allowing them to maintain good control over the quantity and quality of Sawmill Residual. These factors suggest that the supply chain in the Natchez BDO Zone is stable and able to support a new operator looking to enter the market.	**Score 1**

Raw RI Score is 1 out of 10.

Notched Salience: No adjustment.	**Score Unnotched**
Impact Level: RI Impact level is deemed *low.*	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 3.33**

1.6. Ownership of Equipment

Rationale: In most cases, suppliers that own or lease equipment for harvest, collection, and processing feedstock are lower risk than those who do not. For example, third-party harvesting equipment may not be available when required. Short harvest windows may be missed if a farmer and contractor cannot schedule harvest times that are convenient and quantity shortages can result.	
Raw RI Score: In the Natchez BDO Zone, we see no significant risk through equipment ownership from sawmills. Producers in the Zone either own the equipment necessary to harvest and collect timber and other forest products (including Forest Residue) or have easy access to it. For example, one of the suppliers within the Zone contracts 20 to 25 logging companies to conduct harvesting operations, indicating the existence of many equipment owners and facilitating ease of access to the necessary equipment. While introducing new equipment to accommodate unusual plant specifications may introduce some risk, suppliers may be willing to invest in new equipment if proper commitments from a proponent are in place. Overall, the availability of necessary equipment and the willingness of suppliers to invest in new equipment suggest a low risk related to equipment ownership in the Natchez BDO Zone. Raw RI Score is 1 out of 10.	**Score 1**
Notched Salience: No adjustment.	**Score Unnotched.**
Impact Level: RI Impact level is deemed *low*.	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 3.33**

1.7. Ownership of Transportation/Logistics

Rationale: In most cases, suppliers that own or lease equipment necessary to transport biomass from forest or field are lower risk than those who do not. However, in some circumstances, reliance on third parties to transport biomass is a common practice and does not contribute to risk.	
Raw RI Score: In the Natchez BDO Zone, most sawmills own trucks, primarily walking-floor trailers, which they use to deliver Sawmill Residuals. Meanwhile, loggers own logging trucks for delivering Pulpwood. However, due to the lack of demand for Forest Residue, there is likely a lack of transport equipment available for this material. If a significant increase in demand for Forest Residue occurred, the transport infrastructure would have to be significantly scaled up. However, because logging companies in the Natchez BDO Zone tend to be relatively small and lack access to significant financing, the scale-up process could take time. Raw RI Score is 5 out of 10.	**Score** 5

Notched Salience: In the Natchez BDO Zone, Pulpwood is less costly than Forest Residue, and it is abundant. Therefore, it is likely that a new bio-project will utilize Pulpwood before turning to Forest Residue, allowing the supply chain to gradually scale up as demand for Forest Residue increases. Raw RI is notched down by 75%.	**Score 1.25**
Impact Level: Due to the lack of detailed data, some uncertainty is associated with transportation ownership. RI Impact level is deemed *medium.*	**Score 6.66**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 8.32.	**Score 8.32**

1.8. Supplier as an Aggregator

Rationale: Aggregators may effectively provide supply chain redundancy, eliminating the risk and complexity of dealing with multiple sources of supply by combining supplies into a single master contact. Aggregators can add much needed stability in BDO Zones by increasing offtake stability for both suppliers and markets. An aggregator can be a more reliable long-term offtake for suppliers by virtue of having multiple markets and can be a more reliable long-term supplier for markets by having access to multiple suppliers. Further, when a single supplier breaches, the aggregator can source from another.	
Raw RI Score: In the Natchez BDO Zone, several biomass aggregators are moving substantial amounts of both Sawmill Residuals and Pulpwood across the region. Some of these companies are even seeking additional markets, particularly for bark. Typically, aggregators prefer longer-term contracts to the spot market, which adds to the robustness of the system. The presence of these aggregators in the BDO Zone presents an opportunity for a new bio-project to work with companies that specialize in moving, rather than producing, feedstock. This can help to lower supply chain risk and improve the overall efficiency of the supply chain. Overall, the existence of biomass aggregators in the Natchez BDO Zone suggests a relatively low risk associated with feedstock supply. Raw RI Score is 1 out of 10.	**Score 1**
Notched Salience: No adjustment.	**Score Unnotched**
Impact Level: RI Impact level is deemed *low.*	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 3.33**

1.9. Distance from Proponent

Rationale: The greater the distance from a supplier to a plant, the more exposure it has to weather and fuel cost risks, and the greater the competitive pressure (to breach) that a closer competitor can exert.	
Raw RI Score: In the Natchez BDO Zone, an adequate supply of Pulpwood, Forest Residue, and Sawmill Residuals exist. We expect this supply to remain stable in the future. The industry has indicated that feedstock, particularly bark, is transported distances of over 150 miles, adding to the level of certainty for the BDO Zone's 100-mile woodshed. Additionally, the majority of sawmills in the region are located relatively close to Natchez, within 75 miles. Further details on sawmill locations can be found in Appendix D. Raw RI Score is 1 out of 10.	**Score 1**
Notched Salience: No adjustment.	**Score Unnotched**
Impact Level: The distance between the supplier and the proposed bio-project is a significant variable that can influence the viability of feedstock access. RI Impact level is deemed *high.*	**Score 9.99**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 9.99**

1.10. Fundamental Feedstock Production Experience

Rationale: Risk is higher when a supplier has limited experience with harvesting/processing and/or collecting biomass. Where experience is lacking, the Proponent should show that steps have been taken to ensure proper training, knowledge dissemination, and monitoring.	
Raw RI Score: In the Natchez BDO Zone, the supply of Pulpwood and Sawmill Residuals is well-established, as evidenced by the available inventory, annual harvesting rates since 2009, and the absorption of these materials by current markets. However, the current supply of Forest Residue is limited, as it is rarely collected and processed. Raw RI Score is 5 out of 10.	**Score 5**
Notched Salience: In the Natchez BDO Zone, Pulpwood is abundant and less costly than Forest Residue. Therefore, it is likely that a new bio-project will utilize Pulpwood before turning to Forest Residue, allowing the supply chain to gradually scale up as demand for Forest Residue increases. Raw RI is notched down by 75%.	**Score 1.25**
Impact Level: The experience of feedstock production can have a significant influence on projects requiring large quantities of feedstock. Having experienced suppliers and producers in the supply chain can help to ensure a reliable and stable supply of feedstock, while less experienced suppliers may face challenges in meeting the demand for feedstock RI Impact level is deemed *high.*	**Score 9.99**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 12.48**

1.11 Production Scale Experience

Rationale: Scale-up entails risk. Risk is higher when a supplier has limited experience with the production of the quantity of feedstock required.	
Raw RI Score: **Sawmill Residual:** Our analysis indicates that sawmills in the region generate approximately 1.25 million bdt/yr of Sawmill Residual, of which approximately 627,000 bdt/yr would be available for use by a new bio-project. Importantly, this quantity of feedstock is already produced as a by-product of existing sawmill operations, eliminating any significant concerns related to scale up risk. Furthermore, local sawmills in the region have been in operation for several decades, suggesting that the production scale experience is not of concern. **Forest Residue:** Our analysis indicates a lack of significant demand for Forest Residue in the region has led to the limited infrastructure available for its collection and processing. This is a major factor contributing to the significant scale up risk associated with Forest Residue production. Additionally, we have observed that most logging companies in the region are relatively small, limiting their ability to acquire capital and purchase the necessary equipment for Forest Residue processing and transportation in the short term. This further exacerbates the scale up risks associated with Forest Residue production. **Pulpwood:** Our analysis indicates that the logging infrastructure in the region is robust and healthy, as evidenced by the ongoing operational success of local sawmilling and pulp and paper industries. This suggests that the region has significant experience and expertise in logging, and it is believed that the risks related to pulpwood harvesting and transport scale up are low. Raw RI Score is 5 out of 10.	**Score** 4
Notched Salience: In the Natchez BDO Zone, Pulpwood is abundant and less costly than Forest Residue. Therefore, it is likely that a new bio-project will utilize Pulpwood before turning to Forest Residue, allowing the supply chain to gradually scale up as demand for Forest Residue increases. Raw RI is notched down by 75%. Notched Salience is 1.25.	**Score** **1.25**
Impact Level: Given the potential size and scope of large-scale projects, any issues related to production scale up could have substantial impacts on the success of the project. Therefore, even though we are fairly confident in our assessment of production scale up experience, we believe that it is important to consider the potential impact of this risk when evaluating potential feedstock options for large scale projects. RI Impact level is deemed *high.*	**Score** **9.99**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 12.49.	**Score** **12.49**

1.12. Feedstock Production Priority

Rationale: When biomass feedstock is a secondary or non-core line of business, or when it is a by-product or a residual from a more valuable primary product, then suppliers may not put in sufficient effort for consistent production. Risk of breach increases when production and/or delivery of feedstock compromises a supplier's ability to make a primary product.	
Raw RI Score:	**Score 4**
Sawmill Residuals: Sawmill Residuals are generated as a by-product of lumber and other wood products manufacturing, suggesting that the feedstock production priority risk associated with Sawmill Residuals is relatively low. **Forest Residue:** Our analysis suggests that Forest Residue is currently in low demand in the BDO Zone, resulting in limited infrastructure for its collection, processing, and transportation. While some loggers have expressed interest in producing Forest Residue, others have indicated that they are not interested. This is likely due to the lower risk associated with the roundwood production business model. Given these factors, the production priority risk related to Forest Residue is high. **Pulpwood:** Our analysis indicates that Pulpwood harvesting has been a longstanding activity in the BDO Zone, with a surplus of Pulpwood available in the region. The abundance of Pulpwood and the need to remove it from the landscape create a strong incentive for landowners and loggers to prioritize Pulpwood harvesting. We believe this strong incentive will remain in place even with new demand in the market. As a result, we consider the production priority risk associated with Pulpwood harvesting to be relatively low. Raw RI Score is 4 out of 10.	
Notched Salience: In the Natchez BDO Zone, Pulpwood is less costly than Forest Residue and is abundant. Therefore, it is likely that a new bio-project will utilize Pulpwood before turning to Forest Residue, allowing the supply chain to scale up as demand for Forest Residue increases gradually. Raw RI is notched down by 75%. Notched Salience is 1.	**Score 1**
Impact Level: Given the potential size and scope of large-scale projects, any issues related to feedstock production priority could have a substantial impact on the success of the project. Therefore, even though we are fairly confident in our assessment of feedstock production priority, we believe that it is important to consider the potential impact of this risk when evaluating potential feedstock options for large scale projects. RI Impact level is deemed *high.*	**Score 9.99**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 9.99.	**Score 9.99**

CATEGORY 2: COMPETITOR RISK

2.1. Competitor Locations and Geographical Influence on the Market

Rationale: Competitors' locations relative to a Proponent plant can affect the viability of procuring feedstock and its cost. Accurate and detailed competitor mapping provides an understanding of the geographical influence a competitor may have, including competitive advantages such as short-hauling.	
Raw RI Score: Our analysis indicates there are twenty identified competitors for woody biomass feedstock within a 200-mile drive from Natchez, which we refer to as the "competition zone". These competitors include 13 pulp mills, 4 wood pellet mills, 2 OSB mills, and 1 mulch producer. Based on our estimates, the combined consumption of woody biomass (Pulpwood, Forest Residue, and Sawmill Residuals) by these competitors is around 20 million bdt per year, with only a portion of that amount coming from the BDO Zone itself. However, more than half of the identified competitors are located more than 100 miles from Natchez, and as such, their impact on the BDO Zone is relatively limited. Additionally, our analysis takes current competition into account, and even with this consideration, we estimate there to be 6.93 million bdt/yr of available feedstock for prospective projects. Based on these findings, we believe that while there is competition for woody biomass feedstock in the region, the impact of this competition on potential projects in the BDO Zone is relatively low. Raw RI Score is 1 out of 10.	**Score 1**
Notched Salience: No adjustment.	**Score Unnotched 1.0**
Impact Level: Our analysis indicates that the present competition for feedstock in the region has a relatively low impact on potential feedstock availability for new bio-projects, based on our thorough review of competitors. However, we recognize that in situations where a few large competitors have a significant impact on the local market for feedstock, the impact on a new bio-project could be substantial. Such a scenario could result in reduced availability of feedstock, higher prices, or both, which could adversely impact the financial viability of a new project. RI Impact level is deemed *high.*	**Score 9.99**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 9.99.	**Score 9.99**

2.2. Historical Fluctuation of Quantity Used

Rationale: Clear understanding of key competitors' consumption of each type of feedstock utilized by the Proponent is essential to quantifying the risks associated with each competitor. Understanding historical trends of feedstock utilization can provide valuable information about feedstock price elasticity during shortages and insights into events impacting future supply conditions. It can also enable more accurate estimates of the sensitivity of feedstock availability to potential future consumption levels or to the impact of external events (e.g., weather events, structural economic changes, seasonality, or policy change).	
Raw RI Score: **Sawmill Residual:** Detailed historical data on Sawmill Residual consumption by competitors is not available. However, we believe the lack of such data poses a very low risk, given that all Sawmill Residual generated by sawmills in the region have markets. Even in situations where local demand for Sawmill Residual disappears, we note that this feedstock source can be transported to areas where demand exists. Overall, we consider the lack of detailed historical data on Sawmill Residual consumption by competitors to be a very low-risk factor for potential bio-projects in the region. **Forest Residue:** Our analysis indicates that historically, there has been relatively little consumption of Forest Residue in the BDO Zone. Given this situation, the lack of historical data related to Forest Residue consumption is expected and not considered a significant risk in our assessment of potential feedstock sources for bio-projects in the region. **Pulpwood:** Although historical consumption data at the facility level for Pulpwood do not exist, we have been able to use historical pulpwood harvest removal data provided by the US Forest Service to assess the consumption of this feedstock source. Based on Figures C-1 and C-2 in Appendix C, we have observed that the historical harvest removals for both softwood and hardwood Pulpwood have remained relatively stable over the past decade. Therefore, we believe that the risk related to historical pulpwood consumption is low. Overall, we consider the stability of historical pulpwood harvest removal data to be a positive factor. Raw RI Score is 1 out of 10.	**Score 1**
Notched Salience: No adjustment.	**Score 1.0**
Impact Level: Based on information provided above under Raw RI Score evaluation, we deem the impact of this RI *low*.	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 3.33**

2.3. Competitor Pricing and Price Sensitivity

Rationale: Understanding how much competitors pay for different feedstock types is an essential step in determining competitiveness of Proponent. Historical prices paid by competitors provide insight into their procurement behaviors and ability/willingness to pay premiums for feedstock and exert pressure on Proponent's suppliers during times of feedstock shortage. Competitors who are able to offer higher prices for feedstock during feedstock shortages can pose significant risks to Proponent.	
Raw RI Score: Our analysis indicates that current delivered pricing for the assessed types of feedstocks within the BDO Zone is approximately $100.00/bdt for Forest Residues, $58.60 - $66.46/bdt for Pulpwood, and $77.60 - $93.40/bdt for Sawmill Residuals. Our historical pricing analysis observed that nominal term prices for woody biomass feedstock within the BDO Zone have steadily risen over the past four to five decades. However, real term pricing has generally been decreasing over the same period. Looking ahead, nominal term pricing is projected to continue to rise over the next 18 to 20 years. However, real term pricing will likely continue to decrease or minimally experience less pronounced upward curves compared to nominal term prices. We do see the material risk associated with large mills competing for Sawmill Residuals. However, these facilities are well established and may be able to tolerate higher prices temporarily to exert pressure on new competitors. As a result, the risk of price competition for Sawmill Residuals is relatively high, particularly for new entrants to the market.	**Score 4**
Notched Salience: The risk related to competitors' potential tolerance for short-term price increases is mitigated by the large quantity of available feedstock. Raw RI is notched down by 50%. Notched Salience is 2.0.	**Notched Score 2.0**
Impact Level: There is a high degree of uncertainty related to our understanding of competitors' price sensitivity. RI Impact level is deemed *high.*	**Score 9.99**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 13.32.	**Score 19.98**

2.4. Supply Influence of Competitor

Rationale: In some cases, competitors may be able to exert high degrees of pressure on local suppliers, effectively enabling them to control feedstock, especially during shortages. This control can derive from long previous relationships between suppliers and competitors, from verbal or "understood" agreements, or from a competitor being able to assist suppliers in times of surplus by maintaining large inventories that enable suppliers to continue supplying when other markets impose quotas. Understanding and planning around such soft risk factors is important. If such relationships exist in the Proponent's procurement area, they may indicate an increased risk of feedstock shortage or pricing changes.	
Raw RI Score:	**Score 5**

Our analysis suggests that historically, certain pulp mills in the BDO Zone used an "all-or-nothing" tactic to influence sawmills to supply all of their residuals. Under this approach, pulp mills would pressure sawmills to make all of their residuals available at a relatively low price, threatening to cease buying from the sawmill altogether if they did not comply.

However, we have not identified any evidence that this approach is currently being used by pulp mills in the region to influence sawmill operations, suggesting the practice is out of date. Furthermore, we note that this approach pertains only to Sawmill Residuals, and not to Pulpwood or Forest Residue.

Overall, we believe that the risk associated with this historical "all-or-nothing" tactic is currently low for potential bio-projects in the BDO Zone. While this approach may have had an impact on the availability and pricing of Sawmill Residuals in the past, it is not currently a significant factor affecting the supply of feedstock in the region.

That being said, there is a possibility that the "all-or-nothing" approach could be reintroduced in response to the entry of a new large bio-project into the market. As a result, we consider the risk of this tactic to be a moderate factor for potential bio-projects in the region. While we cannot predict with certainty whether this practice will be used in the future, we believe that it is important for potential investors to be aware of this risk and to consider strategies to mitigate its potential impact.

Raw RI Score is 5 out of 10.

Notched Salience: The risk related to supply influence of competitor is mitigated by the large quantity of available feedstock. Raw RI is notched down by 50%. Notched Salience is 1.5.	**Notched Score 2.5**
Impact Level: Risks related to competitors' influence over suppliers are limited to Sawmill Residual, and do not affect Pulpwood and Forest Residue. RI Impact level is deemed *moderate.*	**Score 6.66**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 6.66.	**Score 16.65**

2.5. Temporary Market-Driven Markets

Rationale: Alternative, non-traditional, market-driven competitors for feedstock can increase feedstock demand in unusual circumstances.

Raw RI Score: **Score 1**

Our analysis suggests that there are seasonal markets for wood fiber in the BDO Zone, including firewood and mulch. While these markets do exist, we believe that they are relatively insignificant in comparison to the overall quantity of feedstock available in the region.

Raw RI Score is 1 out of 10.

Notched Salience: No adjustment.	**Score Unnotched 1.0**
Impact Level: The large quantity of feedstock available renders any temporary market small in comparison. RI Impact level is deemed *low.*	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 9.99.	**Score 9.99**

2.6. Demand for Competitors' Products

Rationale: Increased demand for competitor's product can cause greater demand for feedstock by the competitor. For example, greater demand for biofuels due to a clean fuels policy can cause increased biofuel production by the competitor, thereby increasing demand for feedstock.	
Raw RI Score: Our analysis indicates that several markets for woody biomass feedstock are likely to experience growth over the next decade, including the wood pellet market, Sustainable Aviation Fuel (SAF), Renewable Diesel, Renewable Hydrogen, and bioenergy with carbon capture and storage (BECCS). We have identified several proposed facilities within a 200-mile drive distance of Natchez that are planning to consume woody biomass, as shown in Appendix F. The demand for wood pellets is anticipated to only increase globally within the next decade, especially in Europe and East Asia. Additionally, major suppliers of wood pellets to the European market, Russia and Belarus, have been put on import bans, which are expected to remain in the near future due to the war in Ukraine. The US Southeast is one of the major wood pellet producing regions in the world, with four operating wood pellet mills in the BDO Zone that affect the woody biomass supply chain. We anticipate that the demand for woody biomass from pellet mills will continue to increase, whether through expansion of existing operations or the development of new mills. The SAF manufacturing industry is still in its early stages, but it is likely to develop significantly over the next five to ten years due to the high demand driven by airlines to reduce their carbon emissions. We have identified four proposed SAF facilities within a 200-mile drive distance of Natchez. Many SAF developers plan to manufacture Renewable Diesel and Green Hydrogen as well. Although the demand for these fuels is high, whether they can be manufactured profitably at a commercial scale is still unproven. However, all these industries may experience significant growth in the next decade. Three out of the four proposed SAF facilities also plan to produce Renewable Diesel and Hydrogen. Cumulatively, the four proposed facilities plan to intake over 3 million tons per year of woody biomass, of which approximately 2.2 million would be sourced from the Natchez BDO Zone. Finally, BECCS is a new industry being co-developed alongside SAF, Renewable Diesel, and Green Hydrogen industries. Although the economic feasibility of commercial-scale BECCS operations remains unproven, the demand for carbon capture and resulting carbon credits is projected to increase over the next decade, potentially prompting new BECCS developments in the region.	**Score 8**

While a few established companies are looking into setting up BECCS operations, it remains to be seen whether this industry will grow significantly in the BDO Zone. Overall, we believe that the growth of the woody biomass feedstock market is likely to have a significant impact on the competitive landscape in the BDO Zone. Raw RI Score is 8 out of 10.	
Notched Salience: The risk of potential competition for woody biomass from SAF, Renewable Diesel, Green Hydrogen, and BECCS industries is currently mitigated by the fact that their economic feasibility at a commercial scale is unproven. Furthermore, the impact of the wood pellet industry on the availability of woody biomass is expected to be limited, relative to the sheer quantity of feedstock available, meaning that there is a likely window of opportunity for a new bio-project to enter the market before these untested industries fully develop, and potentially threaten the supply chain. Raw RI is notched down by 25%. Notched Salience is 6.0.	**Score Unnotched 6.0**
Impact Level: Once all industries reviewed here mature, the impact in the woody biomass supply chain in the BDO Zone is expected to be significant. RI Impact level is deemed *high.*	**Score 9.99**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 59.94.	**Score 59.94**

CATEGORY 3: SUPPLY CHAIN RISK

3.1. Biomass Availability Multiple (BAM)

Rationale: Biomass Availability Multiple (BAM) indicates the degree of redundancy in a Proponent's supply chain. BAM is the ratio of biomass feedstock available to a project, at costs, timing, and in quality feasible for the Proponent, divided by the project's feedstock requirements. BAM is a strong indicator of supply chain resilience when stressed by supply shortage and/or supplier breach.	
Raw RI Score: **Sawmill Residuals:** The Natchez BDO Zone is home to a substantial sawmill industry, with 24 fairly large sawmills operating in the area. Currently, these sawmills produce an estimated 1,254,961 bone dry tons per year (bdt/yr) of Sawmill Residuals within the Zone. Therefore, the Biomass Availability Multiple for Sawmill Residuals is 2.09, based on the rating of 600,000 bdt/yr. **Forest Residuals:** In the Natchez BDO Zone, approximately 1.84 million bdt/yr of Forest Residue is generated. Therefore, the Biomass Availability Multiple for Forest Residue is 4.0, based on the rating of 460,000 bdt/yr. **Pulpwood:** Potentially 5.84 million bdt/yr of unutilized (growth less removals) Pulpwood is available in the Natchez BDO Zone. Therefore, the Biomass Availability Multiple for Pulpwood is 2.3. Due to the fact that the Biomass Availability Multiples are above 2.0 for all feedstock streams considered, the Raw RI Score is 1 out of 10.	**Score 1**

Notched Salience: No adjustment.	**Score Unnotched 1.0**
Impact Level: Feedstock redundancy, or BAM, is an important variable when assessing feedstock supply feasibility, and its level can impact the supply chain significantly. RI Impact level is deemed *high.*	**Score 9.99**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 6.66.	**Score 9.99**

3.2. Impact of Increased Utilization of Feedstock

Rationale: Feedstock utilization in a Natchez BDO Zone can change over time. Existing consumers of feedstock can expand operations or new facilities can enter the market. Increased utilization puts additional pressure on feedstock and can lead to higher prices, feedstock disruptions, shortages, or supplier breach.

Raw RI Score: **Score 2**

The current Biomass Availability Multiple (BAM) of 4.95 indicates sufficient room in the market for increased feedstock utilization without risking oversaturation or upward pressure on prices. Notably, Forest Residue and Pulpwood represent the majority of currently unutilized feedstock, suggesting potential for increased utilization in these areas.
Quantities of standing softwood and hardwood pulpwood within 100 miles of Natchez, MS, have increased significantly over the past decade. An average of 1.365 million bdt of additional softwood pulpwood and 0.74 million bdt of hardwood pulpwood have been added to private timberlands annually. Although the growth-to-drain ratio of softwood pulpwood has decreased from 2.77 to 2.13 between 2009 and 2020, the current ratio of 2.13 still indicates a significant abundance of Pulpwood and ample room for additional consumers. Similarly, the growth-to-drain ratio of hardwood Pulpwood has remained steady at 3.75 since 2012, indicating a large supply of hardwood Pulpwood with relatively few markets.

Increased utilization of Forest Residue and Pulpwood is unlikely to negatively impact forest health if removals are conducted in accordance with local, state, and federal regulations. In fact, the removal of pulpwood-sized material as well as Forest Residue is often viewed as beneficial, improving forest stand quality.

Raw RI Score is 2 out of 10.

Notched Salience: No adjustment.	**Score 2.0**
Impact Level: Although we demonstrate large feedstock availability and growth-to-drain ratio, there is uncertainty around the actual scale of increased utilization of feedstock (more detailed discussion in provided in RI 2.6). RI Impact level is deemed *high.*	**Score 9.99**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 19.98**

3.3. Seasonal Feedstock Supply Variation

Rationale: Biomass supply can present significant seasonal supply variations; combined with limitations associated with longer-distance transportation and storage, can lead to regional biomass supply imbalances and manifest in shortages and higher costs for Proponents.	
Raw RI Score: During periods of heavy rainfall or major snow events, there is a possibility of minor temporary delays in logging activities, which could result in variations in Sawmill Residual, Forest Residue, and Pulpwood production. However, based on our assessment, the impact of these delays is generally limited and does not pose a significant risk to feedstock availability. Raw RI Score is 3 out of 10.	**Score 3**
Notched Salience: Sufficient inventory would help to mitigate most of the risk associated with delays in feedstock production brought on by seasonality. Raw RI Score is notched down by 50%. Notched Salience is 1.5.	**Score 1.5**
Impact Level: We observed that seasonal variations in feedstock supply have not resulted in severe operational disturbances in the BDO Zone. Thus, we confidence in our assessment of the potential impact of seasonal feedstock supply variations. RI Impact level is deemed *low.*	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 4.99.	**Score 4.99**

3.4. Year-to-Year Variation in Feedstock Availability

Rationale: Biomass can have significant fluctuations in year-to-year supply due to variability in yield from biomass harvesting operations.	
Raw RI Score: Variation in Sawmill Residual production follows variation in lumber production. Anecdotal evidence indicates that lumber production is historically stable and is expected to remain so in the short- to long-term. Variation in Forest Residue generation follows variation in roundwood harvesting. Between 2009 and 2020, softwood harvest removals varied from 2.9 million bdt/yr to 3.1 million bdt/yr, while hardwood harvest removals varied from 1.5 million bdt/yr to 2 million bdt/yr[3]. We consider these variations insignificant. As indicated by Figure C-1 in Appendix C, Pulpwood net growth has experienced very little variation in the past decade. This trend is expected to continue. Raw RI Score is 1 out of 10.	**Score** 1
Notched Salience: No adjustment.	**Score Unnotched 1.0**

[3] FIA EVALIDATOR – USDA FOREST SERVICE (https://apps.fs.usda.gov/fiadb-api/evalidator)

Impact Level: Our analysis of lumber production variation was conducted at a high level through interviews with local experts. Therefore, there is a degree of uncertainty in our assessment of Sawmill Residual year-to-year production variability. RI Impact level is deemed *moderate.*	**Score 6.66**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 6.66.	**Score 6.66**

3.5. Front-End Validation of Data Used in Feedstock Availability Models

Rationale: Feedstock supply models can be complex. Lack of clarity about model assumptions and baseline data can result in confusion on the part of the capital markets and drive financing costs for biomass projects. The adequacy and credibility of assumptions and baseline data is paramount to credible model outputs.	
Raw RI Score: Based on our research and feedback from industry experts, we believe that the risk of inaccuracies in Sawmill Residual availability estimates is low, as they are derived using industry-accepted conversion factors and validated through conversations with sawmill operators. However, there is a degree of risk associated with Forest Residue availability estimates due to their reliance on capture rate assumptions, which may not fully account for variables such as topography, road network, and harvesting practices. Similarly, our Pulpwood availability estimates are based on high-level data from the USDA's FIA EVALIDATOR tool, which may not fully account for the same variables. While some degree of error is built into these estimates, feedback from sawmill operators and land owners suggests that the FIA tool tends to underestimate the actual availability of Pulpwood in the region, effectively mitigating some of the modelling inaccuracies from a feedstock availability perspective. Raw RI Score is 6 out of 10.	**Score 6**
Notched Salience: We have taken a conservative approach in our BDO Zone assessment by using results from a conservative scenario where broad assumptions were necessary. This approach additionally mitigates risks associated with using broad assumptions that may be too optimistic, ensuring that our assessment reflects a more realistic view of the situation. Raw RI is notched down by 50%. Notched Salience is 3.0.	**Score Unnotched 3.0**
Impact Level: Because most of our conclusions in this assessment are based on woody biomass availability modelling, errors in our assumptions can have significant impact to supply chain risk. RI Impact level is deemed *high.*	**Score 9.99**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 29.97.	**Score 29.97**

3.6. Low Historical Demand for Feedstock in the BDO Zone

Rationale: If the Proponent does not have a history of developing, large-scale feedstock procurement, suppliers may not have sufficient expertise in feedstock production to ensure reliable supply, especially early on.	
Raw RI Score: Sawmill Residuals and Pulpwood have a long history of extensive utilization in the BDO Zone, spanning over a century. Therefore, from a historical demand perspective, there is no significant risk associated with these feedstock types. However, Forest Residue has not traditionally been utilized in large quantities, making the risks associated with this risk indicator. Raw RI Score is 5 out of 10.	**Score** 5
Notched Salience: A bio-project that plans to utilize Forest Residue is expected to also use Pulpwood as a feedstock, due to its abundance and lower cost in the BDO Zone. In the initial years of the project, Pulpwood is likely to be the primary feedstock source as Forest Residue supply chains are scaled up. As they expand, the risks associated with the historical lack of demand for Forest Residue should decrease. Raw RI is notched down by 75%. Notched Salience is 1.25.	**Score Unnotched 1.25**
Impact Level: The lack of historical demand for large-scale feedstock production in the BDO Zone suggests a potential lack of experience and expertise within the supply chain. This factor could have a significant impact on the overall supply chain. RI Impact level is deemed *high.*	**Score 9.99**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 12.49.	**Score 12.49**

3.7. History of Production/Feedstock is a Secondary Crop or a Byproduct

Rationale: If the feedstock is a new/secondary crop or a by-product, suppliers may either lack sufficient experience to mitigate risk or be unable to react to such risk, and producers may be less likely to prioritize production. If the feedstock is a secondary crop, then production can be subject to variables beyond suppliers' control.	
Raw RI Score: Sawmill Residual, Pulpwood, and Forest Residue has been generated as a by-product of timber logging and sawmilling operations for over a century. We do not anticipate any risks related to this RI. Raw RI Score is 1 out of 10.	**Score** 1
Notched Salience: No adjustment.	**Score 1.0**
Impact Level: RI Impact level is deemed low.	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 3.33**

3.8. Diesel Prices

Rationale: Diesel, oil, and PPI can impact feedstock cost of harvest and collection over time. Sensitivities to worst case scenarios should be run.	
Raw RI Score: Regional data from FRED Economic Data[4] database show that diesel prices are volatile and hard to predict, especially in light of recent global events. Diesel prices are currently on a slight downward slope and seem to be stabilizing, after peaking in July 2022 (Figure J-1, Appendix J). Raw RI Score is 5 out of 10.	**Score 5**
Notched Salience: Some of the risks associated with volatile fuel prices could be mitigated by a project engaging in, and favoring, contracts with suppliers located closer to Natchez, reducing transportation costs. Raw RI Score is notched down by 25 %. Notched Salience is 3.75.	**Score 3.75**
Impact Level: RI Impact level is deemed *moderate.*	**Score 6.66**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 24.98.	**Score 24.98**

3.9. Harvest & Collection Practices & Schedules

Rationale: Differences in harvest timing and practices can create risks for both the quantity and quality of the feedstock. For example, feedstock harvested by different suppliers in different windows can undergo varying levels of exposure to sun, wind, and moisture, leading to variations in delivered feedstock quality.	
Raw RI Score: The supply chain in the BDO Zone benefits from established and robust harvest, collection, and scheduling practices. Foresters and fiber producers have implemented standard procedures for forest management practices and timber harvest. However, unforeseen factors such as inclement weather or extended periods of impassable roads can introduce risk to the supply chain. Raw RI Score is 6 out of 10.	**Score 6**
Notched Salience: Maintaining a sufficient feedstock inventory will mitigate the risk of feedstock shortages caused by unforeseen factors such as inclement weather or extended periods of impassable roads. Raw RI Score is notched down by 50 %. Notched Salience is 3.	**Score 3.0**
Impact Level: RI Impact level is deemed *moderate.*	**Score 6.66**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 19.98.	**Score 19.98**

[4] PADD III (Gulf Coast District) Diesel Sales Price (GASDESGCW) | FRED | St. Louis Fed (stlouisfed.org)

3.10. Harvesting & Collection Equipment

Rationale: Different types of harvesting and collection equipment suppliers use can significantly impact the quality and availability of feedstock. The use of different types and combinations of harvesting, collection, and processing equipment can lead to non-homogeneous feedstock. In addition, equipment not designed specifically for biomass cultivation, harvesting, and collection can increase feedstock quality risks. The type of equipment should be specified for the sake of product consistency and risk reduction.	
Raw RI Score: The equipment used for harvesting and collection in the BDO Zone adheres to industry standards. Additionally, established silviculture practices and the presence of numerous professional harvesters indicate that substandard or improper equipment is unlikely to be used. However, suppliers may need to invest in new equipment to accommodate the production of Forest Residue. Raw RI Score is 2 out of 10.	**Score 2**
Notched Salience: No adjustment.	**Score 2.0**
Impact Level: RI Impact Level is deemed *low.*	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 6.66**

3.11. Temporary Externality-Driven Markets for Feedstock

Rationale: Alternative, non-traditional, externality-driven competitors for feedstock can drive feedstock demand (and cost) in unusual circumstances.	
Raw RI Score: We have identified the mulch and firewood markets as the only alternative and/or non-traditional markets within the Zone. However, we do not consider these markets significant competitors for feedstock, as they do not consume large quantities. We have not identified any other temporary externality-driven markets for Sawmill Residuals, Forest Residue, or Pulpwood feedstocks. Raw RI Score is 1 out of 10.	**Score 1**
Notched Salience: No adjustment.	**Score Unnotched**
Impact Level: RI Impact Level is deemed *low.*	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 3.33**

3.12. Variations in Densification Methods Among Different Suppliers

Rationale: The shape and density of the unit in which feedstock is supplied can impact feedstock cost and quality.	
Raw RI Score: There is little variation in densification methods across suppliers. Although the quality of feedstock can vary depending on the source and stage of processing, harvesting and collection methods are generally industry standard. Raw RI Score is 2 out of 10.	**Score 2**
Notched Salience: No adjustment.	**Score Unnotched**
Impact Level: RI Impact Level is deemed *low.*	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 6.66.	**Score 6.66**

3.13. Availability of Labor for Feedstock Production

Rationale: Skilled labor shortages can be difficult to remedy in the short term. Availability of suitable labor in an area can impact the ability to procure sufficient feedstock quantities on schedule. Labor risks are higher for facilities where supply chains are not yet active; or for Proponent's for whom large feedstock requirements, or development of new (or expanded) supply chains, demand significant additions to the local labor force.	
Raw RI Score: In post-pandemic times, there have been labor shortages in multiple industries across the United States for various reasons. Thus, this risk cannot be treated as minor, especially since the duration of labor shortages can be unpredictable. As labor shortage risks might not be as serious for finding feedstock acquisition labor, it could be more prominent within the transportation industry. Raw RI Score is 6 out of 10.	**Score 6**
Notched Salience: Labor shortage issues caused by the pandemic will most probably stabilize by the time proponent's facility goes online. Competitive wages and other working conditions should secure an adequate work force. Robustness of larger transportation companies should compensate for potential labor shortages in this sector. For these reasons, Raw RI Score is notched by 75 %. Notched Salience is 1.5.	**Score 1.5**
Impact Level: RI Impact Level is deemed *moderate.*	**Score 6.66**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 9.99.	**Score 9.99**

3.14. Feedstock Transportation Costs

Rationale: Transportation can be one of the most significant cost components of biomass supply chains. The average transportation cost and percentage of total feedstock cost attributable to transportation should be known.	
Raw RI Score: Transportation costs for woody biomass feedstocks are primarily driven by fuel, distance, and labor costs. Fuel costs have experienced considerable upsurge in 2022 and are difficult to predict in the long-term. After accounting for recent increases in diesel costs, transportation costs are estimated to be $0.21/gt/loaded mile. This estimate is based on analysis conducted by the Forest Resources Association as well as verbal indications from suppliers. A curve demonstrating the increase in transportation costs per ton as a function of distance from Natchez is provided in Figure J-2 of Appendix J. It should be noted that this curve assumes a minimum distance traveled for the feedstock, meaning that transportation costs could still apply even if a supplier is located closer to the facility than the identified 50 miles. Raw RI Score is 5 out of 10.	**Score 5**
Notched Salience: A new bio-project can potentially source feedstock from multiple suppliers located within 50 miles of Natchez, MS, which would result in lower transportation costs. Our findings indicate that this approach is also preferred by suppliers, as they are more interested in supplying projects located near their facilities. Furthermore, the abundance of feedstock available locally justifies this approach, and would help mitigate potential supply chain risks associated with transportation costs. Raw RI Score is notched down by 25 %. Notched Salience is 3.75.	**Score 3.75**
Impact Level: RI Impact Level is deemed *low*.	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 24.98.	**Score 12.49**

3.15. Transportation Distances

Rationale: Transport distances of 40–80 miles for biomass feedstocks are typical but larger distances can be common. When the average transport distance from suppliers to the Proponent is high, the supply chain is subject to greater sensitivities to risks, such as increases in diesel cost, weather impacts, mechanical breakdown, and the demand for feedstock from competitors closer to the source. Understanding average transport distance can help flag higher-risk suppliers where transport distance materially exceeds the average.	
Raw RI Score: Based on data presented in Appendix C, the average distance from suppliers to Natchez, MS, is 64 miles. However, it should be noted that some suppliers have been known to transport bark over distances exceeding 150 miles, indicating that distances larger than the average supplier is from Natchez, MS, are feasible. Detailed distances and mapping can be found in Appendix C.	**Score 3**

Raw RI Score is 3 out of 10.	
Notched Salience: Based on the extensive availability of feedstock within a 100-mile radius of Natchez, MS, the Proponent can limit their supply basin to the closest suppliers. This approach reduces the risk of high transportation costs and other supply chain risks. Raw RI Score is notched by 50 %. Notched Salience is 1.5.	**Score 1.5**
Impact Level: RI Impact Level is deemed *moderate.*	**Score 6.66**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 9.99.	**Score 9.99**

3.16. Transportation of Feedstock Requires Specialized Equipment

Rationale: Requirements for specialized transport equipment can increase supply chain risk. Where there is low availability in required transportation equipment, equipment owners have increased leverage over transportation prices and supply chain resiliency can be lower.	
Raw RI Score: Given the well-established forestry and wood processing industry in the Natchez BDO Zone, it is highly likely that the equipment used is standardized and well-established. The nature of feedstocks hauled has remained consistent over the past several years, further indicating standardization of equipment. Open-top and live-bottom trailers are the most commonly used trailers to transport feedstock, while dump trucks, which can transport smaller volumes and are more prone to breakdowns, are used only when other trailer types are not available. Facilities accepting feedstock transported by live-bottom or dump trailers do not require a self-unloading ramp, providing a potential advantage. Raw RI Score is 1 out of 10.	**Score 1**
Notched Salience: No adjustment.	**Score Unnotched**
Impact Level: RI Impact Level is deemed *low.*	**Score 3.33**
Loaded RI Score Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 3.33**

3.17. Delivery Routes through Local Communities

Rationale: Biomass transportation can become a nuisance to local communities, especially if large numbers of trucks pass through residential and school areas. Local communities often have the power to force regulations regarding truck transport, impeding a Proponent's ability to transport feedstock. This risk is greater in greenfield projects than operational ones.	
Raw RI Score: The forestry and wood industry has been a prominent sector in the Natchez BDO Zone for several decades, with multiple generations of the workforce employed in this field. This has resulted in well-established and accepted delivery routes that are integral to the local communities in the Zone. Raw RI Score is 1 out of 10.	**Score 1**

Notched Salience: No adjustment.	**Score 1**
Impact Level: RI Impact Level is deemed *low.*	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 3.33**

3.18. Transportation Regulations & Local Weight Limits

Rationale: In many regions, transportation is regulated based on seasonal road conditions. These regulations (e.g., "frost laws") often take the form of weight restrictions or limits on the number of trucks allowed on roads. Such regulations can impede the Project's ability to source sufficient feedstock or increase the cost of doing so at certain times of the year.	
Raw RI Score: Considering the volume and mass of timber currently transported in the Natchez BDO Zone, we deem it highly unlikely that transportation regulations could hinder feedstock acquisition or transportation. Raw RI Score is 1 out of 10.	**Score 1**
Notched Salience: No adjustment.	**Score Unnotched 1.0**
Impact Level: RI Impact Level is deemed *low.*	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 3.33**

3.19. Road Infrastructure

Rationale: Feedstock cost and availability can be a function of the accessibility of road infrastructure**.** Problems with road networks will translate directly to risks to feedstock supply.	
Raw RI Score: We believe that the road network in the Natchez BDO Zone is sufficient to support the forestry and wood industry sectors. Industrial sites are typically located near major highways that provide access to other regional destinations. The forest and timberland road networks are well developed due to the large quantities of timber harvested and moved within the Zone. However, according to a 2022 study by the US government, only 73.2% of roads in Mississippi and 74.4% in Louisiana are in good or fair condition, which is lower than most other states. This may pose a risk to the transportation of feedstock and other goods regionally, especially during inclement weather. Raw RI Score is 2 out of 10.	**Score 2**
Notched Salience: No adjustment.	**Score Unnotched**

	2.0
Impact Level: It is likely that all feedstock for a new project will move exclusively by roads. Therefore, the impact of road infrastructure is significant. RI Impact Level is deemed *medium.*	**Score 6.66**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 6.66.	**Score 13.32**

3.20. Number, Size, Mix, & Locations of Suppliers

Rationale: In general, a portfolio of multiple suppliers of various sizes is important for ensuring steady and uninterrupted feedstock supply with minimal price fluctuations. If a small number of large suppliers provide a high proportion of total feedstock, a disruption or supplier breach will have a greater impact on the supply chain. In such cases, the risk of disruption is lower, but the impact of those disruptions is higher. Conversely, a large number of small suppliers is less likely to have the capacity to withstand internal disruptions and may be more likely to breach. Here, the risk of disruption is higher, but the likely impact is lower. The number of suppliers and the ratio of small to large suppliers should be optimized. There is no pre-determined number or optimal ratio of suppliers—either too many or too few can pose higher degrees of risk.	
Raw RI Score: Twenty-eight suppliers were identified in the Natchez BDO Zone, of which 24 are sawmills and 4 are pulp mills offering surplus bark. Regionally there are approximately 6 % of sawmills that produce < 50 mmbf of lumber per year, 44 % that produce 50-100 mmbf/yr, 37.5 % that produce 100-200 mmbf/yr, and 12.5 % that produce >200 mmbf of lumber per year (refer to Appendix D for more details). The number, size distribution, and relatively even dispersion within the BDO Zone are highly advantageous for prospective projects. In addition, a large number of loggers and harvest contractors (at least twenty) also exist in the Zone. Raw RI Score is 1 out of 10.	**Score 1**
Notched Salience: No adjustment.	**Score Unnotched 1.0**
Impact Level: RI Impact Level is deemed *low.*	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 3.33**

3.21. Suppliers Subject to Same External Risk Factors (Non-Weather & Equipment Based)

Rationale: When a single risk event can impact the feedstock production ability of all (or most) suppliers, then feedstock risk is higher and supply chain resiliency is lower. Resilience is maximized when biomass supply chains exhibit diversity in their locations, production practices, and other elements of supply chain structure such that the impact of single, high-risk events have varying impacts on suppliers.	
Raw RI Score: Suppliers in the Natchez BDO Zone are exposed to various common external risks. Economic conditions have significant impacts on the performance of the forest products industry, with the industry performing better than the overall economy during good times and worse during bad times. Solid wood products, such as softwood lumber, are crucial raw materials for new construction and are closely linked to the housing market. Similarly, wood furniture, particularly wood cabinets, is closely tied to the housing market, while packaging materials like corrugated boxes, bags, and fiber drums depend on finished goods shipments. As a result, the pulp and paper sector closely track the overall economy (Dahal et al., 2013). Logging in the Zone is also subject to macroeconomic factors such as the housing market. Downturns in the market can threaten sawmill viability, which in turn, can impact the harvest of sawtimber and forest residues. In addition, increased prices of natural gas could generate risk. Facilities may resort to burning their own residuals, mainly sawdust and bark/hog fuel, making them less available and more expensive for potential projects. Raw RI Score is 5 out of 10.	**Score 5**
Notched Salience: This risk indicator is mitigated by the abundance of feedstock supply. For this reason, Raw RI Score is notched down by 50 %. Notched Salience is 2.5.	**Score 2.5**
Impact Level: Although unlikely, major economic shifts can have significant impact on the entire forest products industry in the BDO Zone. RI Impact Level is deemed *high.*	**Score 9.99**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 37.46.	**Score 24.98**

3.22. Seasonal Weather Impacts on Feedstock Supply

Rationale: Seasonal weather impacts are defined as deriving from natural weather variations (e.g., spring thaws, rainy seasons, or dry seasons) as opposed to singular weather events (like fires, droughts, or hurricanes). Seasonal weather changes can be a significant risk factor affecting feedstock availability, quality, and price.	
Raw RI Score: In the Natchez BDO Zone, temporary disruptions may occur during periods of heavy rain or snowfall, making it difficult for fiber producers to clear trees from timberland, causing dirt roads to become impassable. As a result, all sources of feedstock production may experience variations. Although generally such disruptions are usually temporary and typically do not last more than a few weeks. Moreover, seasonal delays in forest residue and pulpwood generation, especially in the spring, are also possible in the region.	**Score 3**

Raw RI Score is 3 out of 10.	
Notched Salience: Since seasonal delays typically last days or weeks, having a modest but well-maintained feedstock reserve on site would significantly reduce the risk. Raw RI Score is notched by 50 %. Notched Salience is 1.5.	**Score 1.5**
Impact Level: RI Impact Level is deemed *moderate.*	**Score 6.66**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 9.99.	**Score 9.99**

3.23. Long-Term Weather and Climate Trends

Rationale: In certain regions, climate trends and significant potential changes to future weather patterns can create feedstock risk.	
Raw RI Score: Floods and drought in the Natchez BDO Zone are likely to become more severe in the future due to climate change[5]. Wildfires and hurricanes also constitute threats to feedstock supply chain management within the Zone, as they can destroy inventory and bring transportation to a temporary halt. Future impacts due to climate change are inherently unpredictable and pose a salient degree of risk. However, historical year-to-year data do not show substantial variations in harvest removals or growth of feedstock. Raw RI Score is 5 out of 10.	**Score 5**
Notched Salience: The risk is mitigated by the sheer volume and size of the available forest resource. Raw RI is notched down by 50%. Notched Salience is 2.5.	**Score 2.5**
Impact Level: There is a great deal of uncertainty related to climate change and its effect on the BDO Zone. RI Impact Level is deemed *high.*	**Score 9.99**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 24.98.	**Score 24.98**

3.24. Government Subsidies for Feedstock Production or Utilization

Rationale: Feedstock that is directly subsidized through government programs can pose greater long-term risk than feedstock that is not. Subsidies may be subject to amendment or repeal, sometimes with minimal notice. NOTE: This risk indicator refers to direct feedstock subsides only; it does not apply to government subsidies that pertain indirectly to the operations of the Proponent, such as Loan Guarantees, or to the markets for products produced by the Proponent.	
Raw RI Score: As far as we are aware, there are no government subsidies available to incentivize feedstock production in the Natchez BDO Zone. Therefore, suppliers do not depend on government funding to produce feedstock. Raw RI Score is 1.	**Score 1**

[5] U.S. Environmental Protection Agency (US EPA)

Notched Salience: No adjustment.	**Score Unnotched 1.0**
Impact Level: Raw RI Impact level is deemed *low*.	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 3.33**

3.25. Local, Provincial, & National Laws, Regulations, & Permitting Pertaining to Biomass

Rationale: Feedstock production directly dependent on local, provincial, or national laws or government regulations can pose greater long-term risk than feedstock that is not, since laws and regulations may be subject to amendment or repeal. If utilization of biomass requires specific permits (e.g., percentage removal of forest residues or corn stover, allowable cut limits, air emission, storage permits, rights-of-way, overweight permits for trucks, cross-border permitting for shipment of biomass, chain of custody, or certification of sustainability), the likelihood of obtaining such permits and/or complying with permitting requirements should be examined.	
Raw RI Score: We identified no local or state laws or regulations that would prevent or restrict biomass removal from the Natchez BDO Zone forests**.** Raw RI Score is 1 out of 10.	**Score 1**
Notched Salience: No adjustment.	**Score Unnotched 1.0**
Impact Level: RI Impact Level is deemed *low.*	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 3.33**

3.26. Backlash Against Biomass Development, Procurement or Usage in the Region

Rationale: Public backlash against biomass development in the Proponent region can directly impact Proponent's ability to procure, transport, trans-load, store, or utilize feedstock by affecting local policies, regulations, and Proponent's ability to obtain necessary permitting.	
Raw RI Score: We have not found any evidence of negative public perception or opposition towards the wood products industry in the Natchez BDO Zone. As the industry has been established in the region for a significant period of time, we anticipate that the local population will be supportive of any new bio-project. In fact, we believe that such a project will be welcomed and seen as a positive development for the community. Raw RI Score is 1 out of 10.	**Score 1**
Notched Salience: No adjustment.	**Score Unnotched**

	1.0
Impact Level: RI Impact Level is deemed *low.*	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 3.33**

3.27. Feedstock Sustainability, Including Risks to Soil Quality, & Surface & Groundwaters

Rationale: Public concerns about the sustainability of feedstock production can jeopardize biomass feedstock operations. Sustainability certification schemes should be utilized where applicable to ensure that feedstock comes from sustainable sources. Soil sustainability can be defined as the management of soil in a way that does not exert any negative or irreparable effects on the soil or any other systems. There is a diversity of approaches to soil sustainability in jurisdictional guidelines for biomass harvesting and production. Different feedstock types have unique thresholds at which feedstock removal causes significant negative consequences on the soil. Excessive nutrient runoff from biomass feedstock production can accumulate in surface waters and result in algal blooms and hypoxia, which can lead to habitat loss for aquatic species higher up the food chain and alter aquatic ecosystem food webs. Damage to aquatic ecosystems can cause a social and regulatory backlash. Water intake issues can also increase risk.	
Raw RI Score: We assume that all fiber harvest activities in the Natchez BDO Zone comply with local regulations, which we understand to have robust sustainability protocols. This assumption is supported by the fact that private plantations have been growing timber in the region for decades without significant environmental concerns. In fact, removing Pulpwood and Forest Residue from the forest landscape is likely to have a positive environmental impact, such as reducing the risk of wildfires. Raw RI Score is 1 out of 10.	**Score 1**
Notched Salience: No adjustment.	**Score Unnotched 1.0**
Impact Level: Sustainability concerns are significant to bio-projects. RI Impact Level is deemed *high.*	**Score 9.99**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 19.98.	**Score 9.99**

3.28. GHG Emissions from Production, Harvest, & Transport

Rationale: Understanding a project's overall emissions and the carbon intensity throughout the feedstock supply chain is essential to reducing risks related to carbon pricing mechanisms and related regulations Greenhouse gas (GHG) emissions from production, harvest, and transportation can be a significant challenge to Proponent claims of carbon neutrality for biomass projects. Carbon emissions from harvested soils, as well as emissions from harvesting machinery or delivery trucks, can make it difficult to achievement net-zero GHG emissions. If a Proponent's financial model relies on carbon neutrality/GHG regulatory pricing frameworks, it is essential to investigate the feedstock's carbon emission status.	
Raw RI Score: If we assume that: 1) trucks average 6.5 miles per gallon[6]; 2) all feedstocks must be transported 100 miles; 3) trucks can carry 22 tons per delivery; 4) facility intake requirement is 100,000 tons per year; and 5) 19.64 pounds of CO_2 are emitted per gallon of fuel used[7], approximately 2,060 tons of CO_2 would be emitted per year in feedstock transport. However, the average CO_2 carbon sequestration for pine trees is approximately 11 tons per acre of new tree growth[8], meaning only 187 acres of new trees would have to be grown yearly to sequester all the carbon emitted from feedstock transportation. Therefore, given the forestry industry scale in the Natchez BDO Zone, net positive carbon sequestration in relation to transport is likely. GHG emissions stemming from feedstock production and harvest are more difficult to model and will depend on the size of the intake of a new plant in the Zone. Raw RI Score is 1 out of 10.	**Score 1**

Notched Salience: No adjustment.	**Score Unnotched 1.0**
Impact Level: RI Impact Level is deemed *low.*	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 3.33**

3.29. Geographic Location Influence on Feedstock Variability

Rationale: Feedstock from different regions may differ in quality due to variations in soil quality, topography, harvest practices, weather, fertilizer applied, etc.	
Raw RI Score: Geographic location within the Natchez BDO Zone does not impact feedstock variability. While topographic variation exists throughout the forests in the Zone, it is not expected	**Score 1**

[6] Arrow Truck: https://www.arrowtruck.com/blog/2016/06/21/manage-your-semi-trucks-fuel-use-with-these-tips/.
[7] US Energy Information Administration: http://www.patagoniaalliance.org/wp-content/uploads/2014/08/How-much-carbon-dioxide-is-produced-by-burning-gasoline-and-diesel-fuel-FAQ-U.S.-Energy-Information-Administration-EIA.pdf.
[8] GoTree Quotes: https://www.gotreequotes.com/how-much-co2-do-trees-absorb/.

to impact the current heterogeneity of the feedstock categories. Also, the robustness of new biomass feedstock utilization systems can compensate for potential quality inconsistencies. Raw RI Score is 1 out of 10.	
Notched Salience: No adjustment.	**Score Unnotched 1.0**
Impact Level: RI Impact Level is deemed *low.*	**Score 3.33**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 3.33.	**Score 3.33**

3.30. Capacity of Supply Chain Components & Equipment to Scale

Rationale: Scale-up risk increases if supply chain components or underlying feedstock infrastructure necessary for these components cannot scale to handle Proponent feedstock requirements and throughput capacity. Capacity to scale should be demonstrated.	
Raw RI Score: Scaling up the supply chain equipment in the BDO Zone for potential bio-projects utilizing Forest Residue feedstock would require significant capital investments from potential suppliers. The scaling-up process would mainly involve the acquisition of wood processing equipment, such as grinders and chippers, rather than transportation equipment, as the hauling capacity in the region is already robust. Equipment scale-up is not a significant risk for Sawmill Residuals or Pulpwood supply. Raw RI Score is 4 out of 10.	**Score 4**
Notched Salience: A bio-project that plans to utilize Forest Residue is expected to also use Pulpwood as a feedstock, due to its abundance and lower cost in the BDO Zone. In the initial years of the project, Pulpwood is likely to be the primary feedstock source as the supply chain is scaled up. As the supply chain expands, risks associated with Forest Residue production equipment scale-up will decrease. Raw RI Score is notched down by 50%. Notched Salience is 2.0	**Score 2**
Impact Level: RI Impact Level is deemed *moderate.*	**Score 6.66**
Loaded RI Score: Loaded RI Score (Notched Salience × Impact Level) is 6.66.	**Score 13.32**

APPENDIX B: INFRASTRUCTURE

Site selection of Natchez, MS

Location

Natchez is a city located in southwestern Mississippi, near the Mississippi River. It is the county seat of Adams County, and is part of the Natchez, MS–LA Metropolitan Statistical Area. According to the United States Census Bureau, the city has a total area of 13.9 square miles, of which 13.2 square miles is land and 0.6 square miles (4.62%) is water.

Population

According to the United States Census Bureau 2020, the population of Natchez was estimated to be 14,520; with a density of 1,398 per square mile and 0.85% decline in 1 year.

Employment

The largest industries in Natchez are Health Care & Social Assistance (918 people); Retail Trade (614 people); Educational Services (595 people); Office & Administrative Support (520 people); Sales & Related Occupations (445 people). The industries with the best median earnings in 2020 are Finance & Insurance/Real Estate ($76,750); Agriculture, Forestry, Fishing Hunting, & Mining ($59,023).

Site Selection

Natchez has four industrial sites located near the Mississippi river (1) 214 acres Belwood site located on River Terminal Road; (2) 37.65 acres Majorca site located adjacent to River Terminal and Port Road; (3) 270 acres Mississippi River Energy Complex located at Carthage Point Road; and (4) Riva Ridge site located near to Lower Woodville Road.

Site 1- Belwood Industrial site in Natchez, MS



MAP LEGEND
- Proposed Levee Construction
- Boundary Line
- Natchez Railway
- 115 KV Transmission Line

1. Liebherr Crane (300 tons), Adams County Port North Dock
2. Liquid Loading Dock
3. Adams County Port, South Dock
4. World Energy
5. Fortress Proppants
6. Riverside Central
7. Genesis Energy
8. Great River Industries
9. Dozer, Inc.
10. BASF
11. vonDrehle Corp.
12. Delta Energy
13. Entergy Substation
14. Natchez Water Works

Site 2- Mississippi River Energy Complex in Natchez, MS

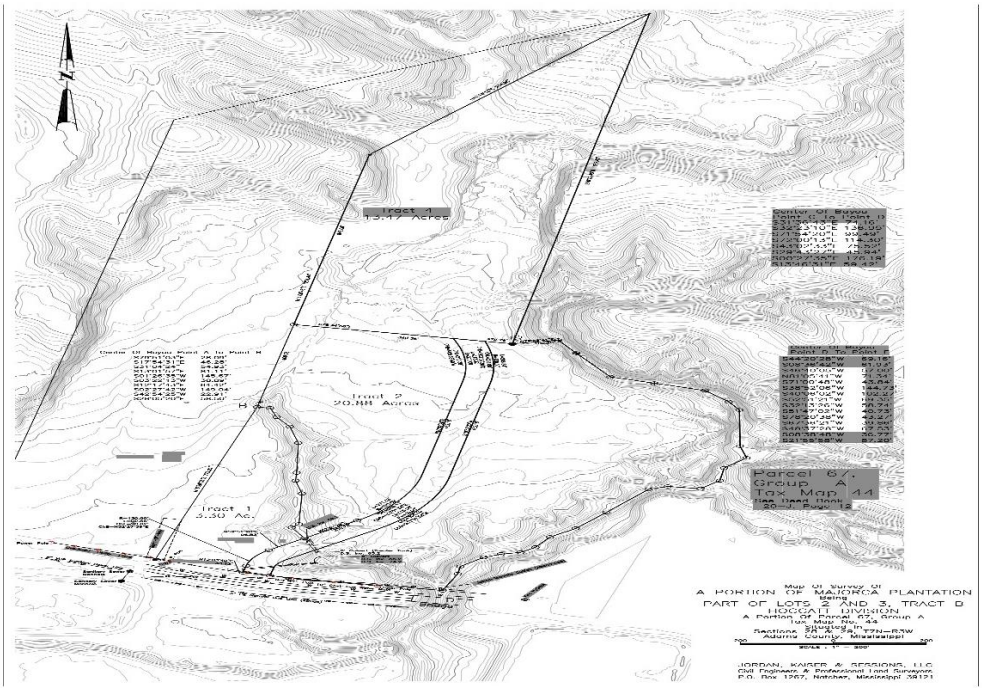


Current Industries/Infrastructure
1. Liebherr Crane (300 tons), Adams County Port North Dock
2. Liquid Loading Dock
3. Adams County Port, South Dock
4. World Energy
5. Fortress Proppants
6. Riverside Central
7. Genesis Energy
8. Great River Industries
9. Dozer, Inc.
10. BASF
11. vonDrehle Corp.
12. Delta Energy
13. Energy Substation
14. Natchez Water Works
15. Cooperative Energy Substation Expansion

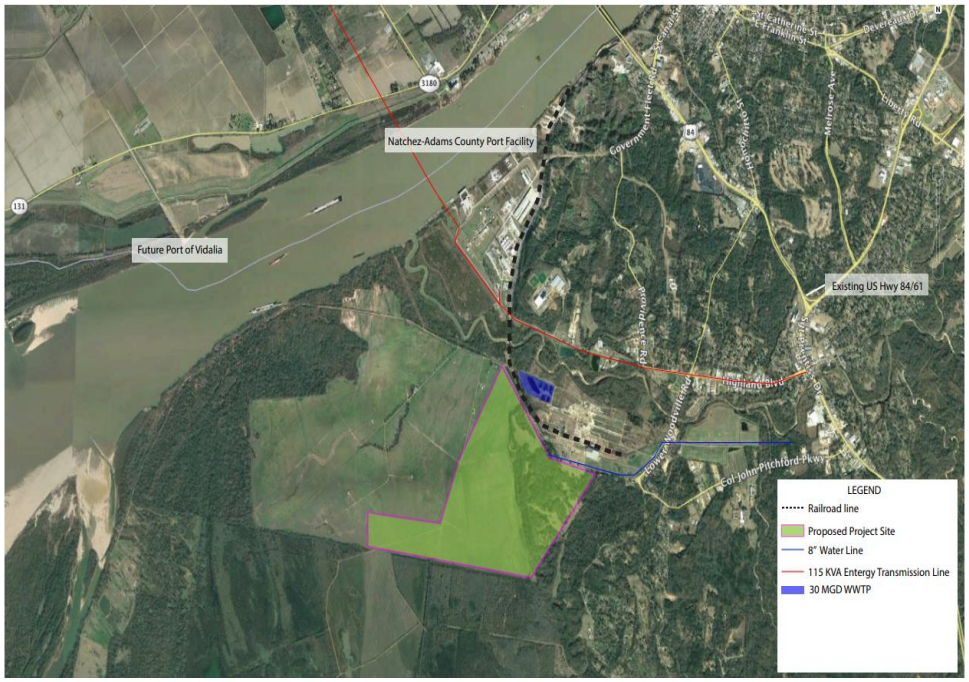
MAP LEGEND
- Boundary Line
- Sewer & Drain Lines
- Potable Water
- Railroad



Site 3- Majorca Industrial site in Natchez, MS



Site 4- Riva Ridge Industrial site in Natchez, MS



On-site Infrastructure:

- Belwood site has Electrical provided by Entergy. The site has 115 kV transmission line and 13.8 kV distribution line. There is 12" Natural Gas Line provided by Atmos Energy; 17-mile interstate pipeline with 6" dia; 25 MM GPD well water provided by Natchez water works; and 42 MGD Wastewater treatment. Broadband and telecommunication are provided by Cable one and Bellsouth. It is a future levee protected site, and construction has started on a ring levee for the site.
- Majorca site has a special flood hazard line from FIRM on its creek.
- Mississippi River Energy Complex is above the floodplain. Electrical is provided by Cooperative Energy. The site has 138/115 kV transmission line and 12.47 kV distribution line. There are two 22" Natural Gas Lines; 17-mile interstate pipeline with 6" dia; 25 MM GPD well water; and 42 MGD Wastewater treatment. There is also a recently refurbished certified truck scale house located on the eastern side of the property.
- Riva Ridge site has a 115 kV transmission line; 8" water line and 30 MGD WWTP. There is also a proposed rail spur near the site.
- Transportation via highway, water and rail is easily accessible to all four sites.
- All four sites are located near US Highways 61 and 84, that are built to interstate standards, and connects to Interstates 55, 20, 10, and 49.
- All four sites are located close to the Natchez-Adams County Port, which is capable of handling wet, dry, and crane services for barges including container on barge. The port's terminal is paralleled by a channel that allows for year-round operation with the exception of high water. Also, a new port "Port of Vidalia" has been proposed across the river.
- All four sites have railway services that connect the port facilities and serve as a connection to the CN mainline in Brookhaven.
- The industrial sites are surrounded by World Energy LLC, Zozer LLC, Genesis Energy, Great River Ind., Bastech Inc, Entergy Substation and Von Drehle Natchez LLC.

Transportation Infrastructure

Roads:

- ✓ 15 miles from Vidalia, Louisiana
- ✓ 33 miles from Ferriday, Louisiana
- ✓ 40 miles from Woodville, Mississippi
- ✓ 70 miles from Brookhaven, Mississippi
- ✓ 85 miles from Baton Rouge
- ✓ 90 miles from Jackson, Mississippi
- ✓ 100 miles from Mc Comb, Mississippi
- ✓ 115 miles from New Orleans, Louisiana
- ✓ 170 miles from Lake Charles
- ✓ 200 miles from Shreveport

Rail:

- ✓ 2 miles from Natchez Train Station
- ✓ 75 miles from Vidalia Amtrak Station
- ✓ 82 miles from Baton Rouge Amtrak Station

Ports:

- ✓ 2 miles from Natchez-Adams County Port
- ✓ 121 miles from Port of Baton Rouge, Louisiana
- ✓ 133 miles from Port of New Orleans, Louisiana
- ✓ 160 miles from Gulf of Mexico

Air:

- ✓ 6 miles from Natchez-Adams County Airport
- ✓ 40 miles from Concordia Parish Airport
- ✓ 54 miles from Evanston-Uinta County Burns Field
- ✓ 82 miles from Alexandria International Airport
- ✓ 87 miles from Baton Rouge Metropolitan Airport
- ✓ 95 miles from Monroe Regional Airport
- ✓ 111 miles from Jackson-Medgar Wiley Evers International Airport
- ✓ 125 miles from New Orleans Louis Armstrong International Airport
- ✓ 135 miles from Lafayette Regional Airport

APPENDIX C: PULPWOOD GROWTH VS REMOVALS

Figure C-1. Historical softwood net growth vs harvest removals within 100 miles from Natchez, on private timberlands 2009 to 2020[9]

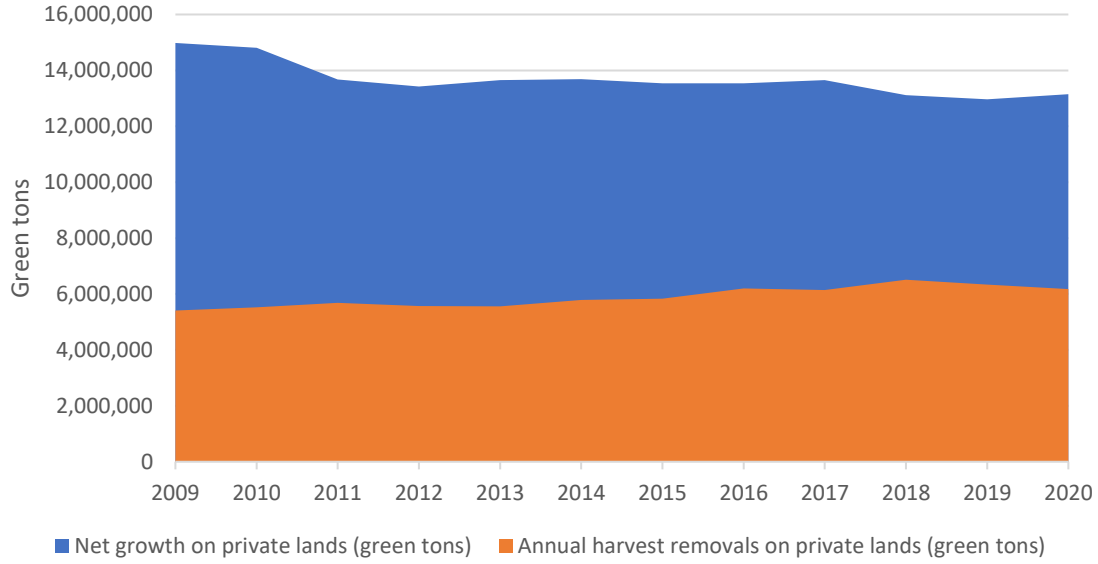
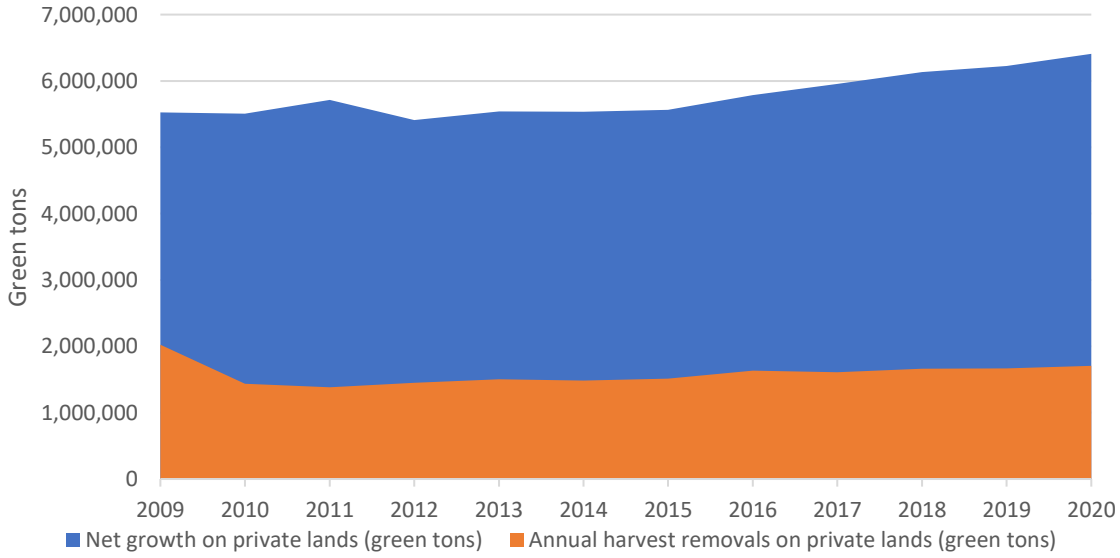


Figure C-2. Historical hardwood net growth vs harvest removals within 100 miles from Natchez, on private timberlands 2009 to 2020[15]



[9] For the purposes of this study, green tons (gt) were converted to bone dry tons (bdt) based on assumption that feedstock's moisture content is 50 %.

APPENDIX D: SAWMILLS

Map D-1. Sawmills within 100 mi drive distance from Natchez, MS

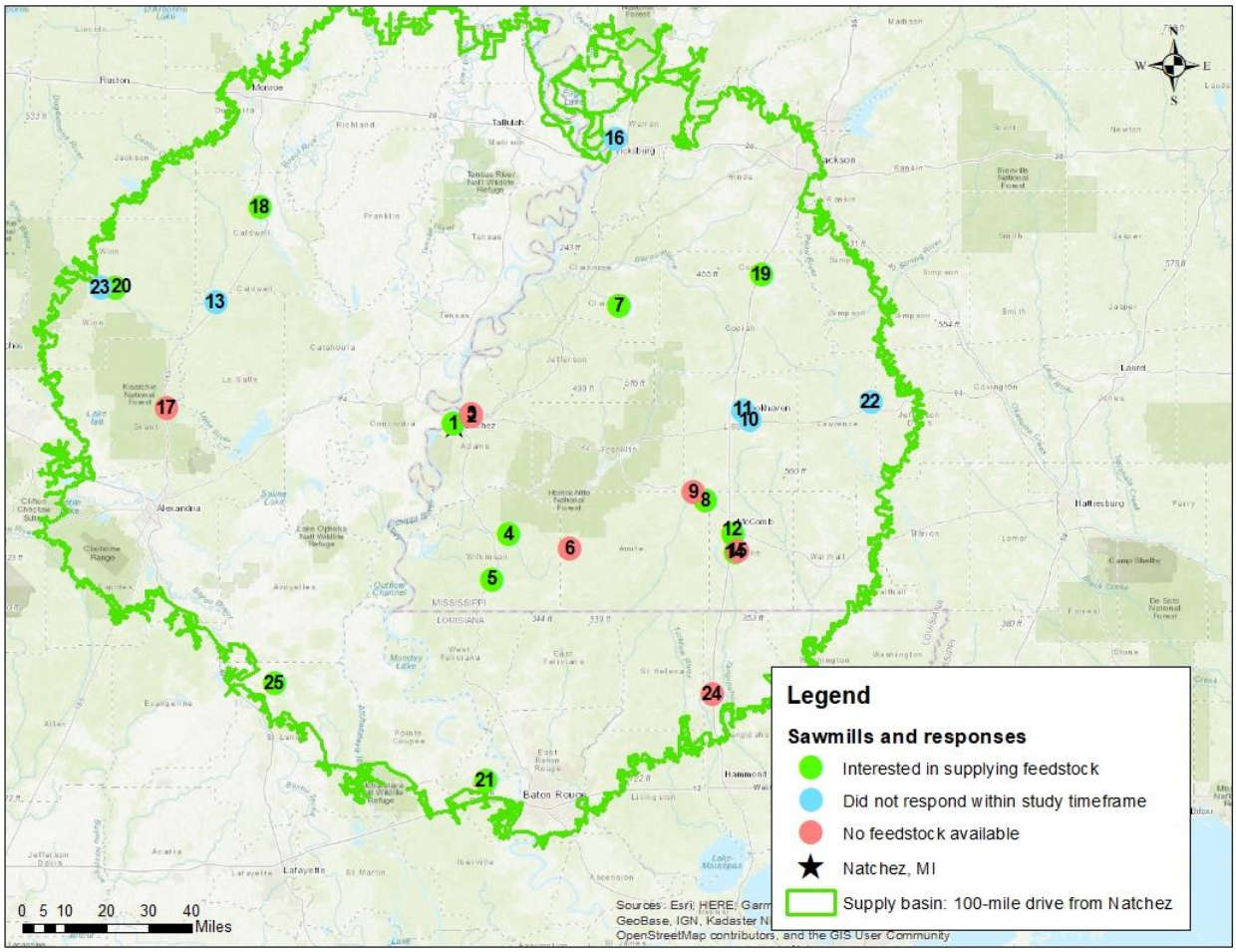


Table D-1. Sawmills within 100 mi drive distance from Natchez, MS

# on Map	Distance (mi)	Sawmill type	Actual lumber production capacity (MMBF)	Assumed MMBF capacity if data missing
1	2	Hardwood	Nd	Nd
2,3	2	Hardwood	50	-
4	30	Hardwood	Nd	-
5	37	Softwood	Nd	-
6	41	Unknown	Nd	-

7	50	Softwood	86	-
8	59	Hardwood	50	-
9	61	Unknown	Nd	50
10	64	Unknown	Nd	50
11	64	Unknown	Nd	100
13	64	Unknown	200	--
12	70	Softwood	Nd	50
14	73	Softwood	245	-
15	74	Unknown	Nd	50
16	74	Unknown	180	-
17	75	Softwood	250	-
18	77	Softwood	Nd	-
19	78	Hardwood	Nd	-
20	86	Softwood	190	-
21	88	Softwood	-	-
22	89	Softwood	Nd	100
23	90	Softwood	100	-
24	100	Softwood	Nd	10
25	105	Hardwood	-	-

APPENDIX E: CURRENT COMPETITION

Map E-1. Current competitors for feedstock within 200 mi drive distance from Natchez, MS

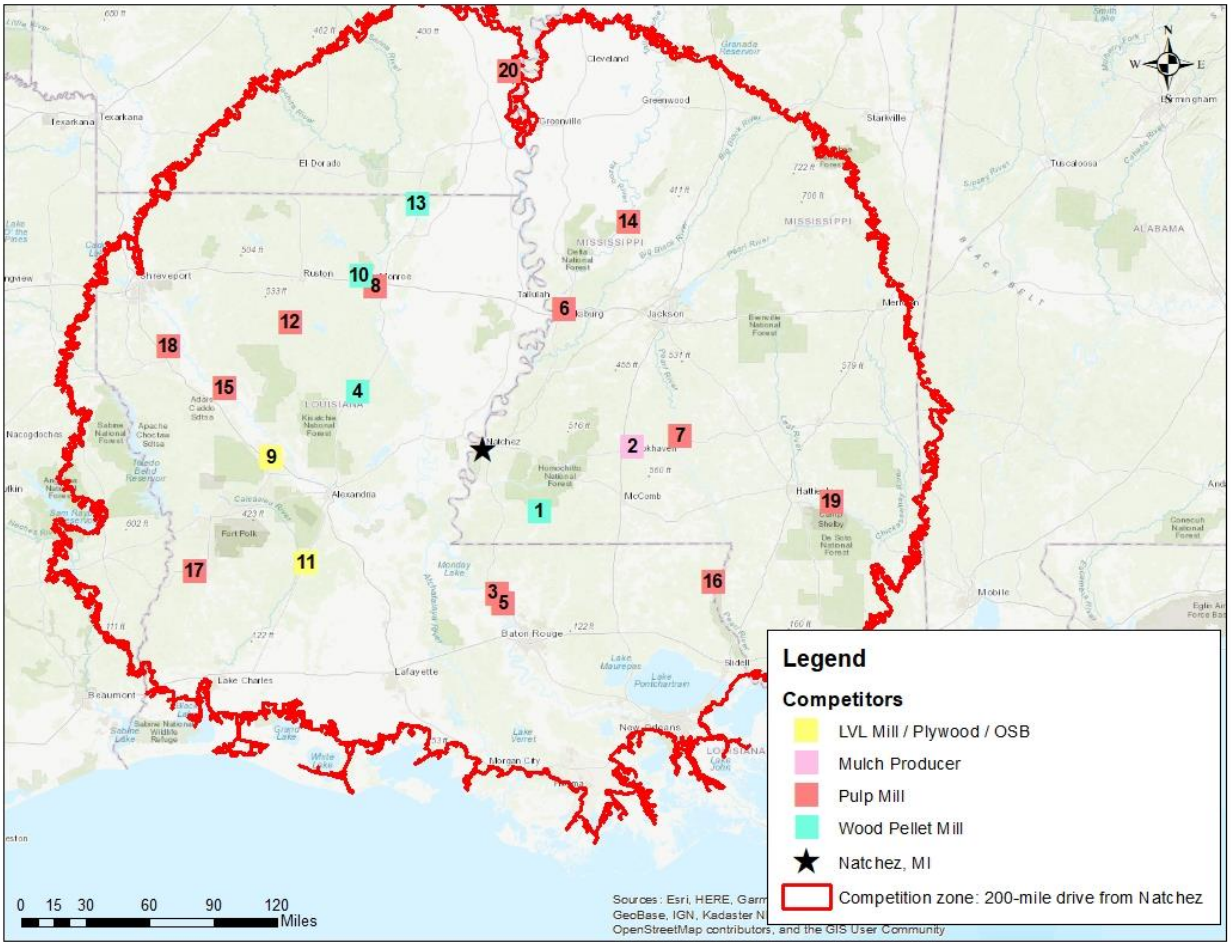


Table E-1. List of current competitors for feedstock within 200 mi drive distance from Natchez, MS

# On Map	Distance to Natchez (mi)	Industry	Estimated feedstock intake (bdt/yr)
1	42	Wood Pellet Mill	500,000
2	64	Mulch Producer	50,000
3	69	Pulp Mill	750,000
4	72	Wood Pellet Mill	500,000
5	76	Pulp Mill	500,000
6	87	Pulp Mill	750,000
7	88	Pulp Mill	1,500,000
8	99	Pulp Mill	1,250,000
9	103	OSB Mill	550,000
10	107	Wood Pellet Mill	60,000
11	108	OSB Mill	750,000
12	115	Pulp Mill	1,250,000
13	117	Wood Pellet Mill	500,000
14	118	Pulp Mill	225,000
15	125	Pulp Mill	750,000
16	126	Pulp Mill	1,500,000
17	153	Pulp Mill	750,000
18	157	Pulp Mill	1,000,000
19	169	Pulp Mill	1,250,000
20	179	Pulp Mill	1,250,000

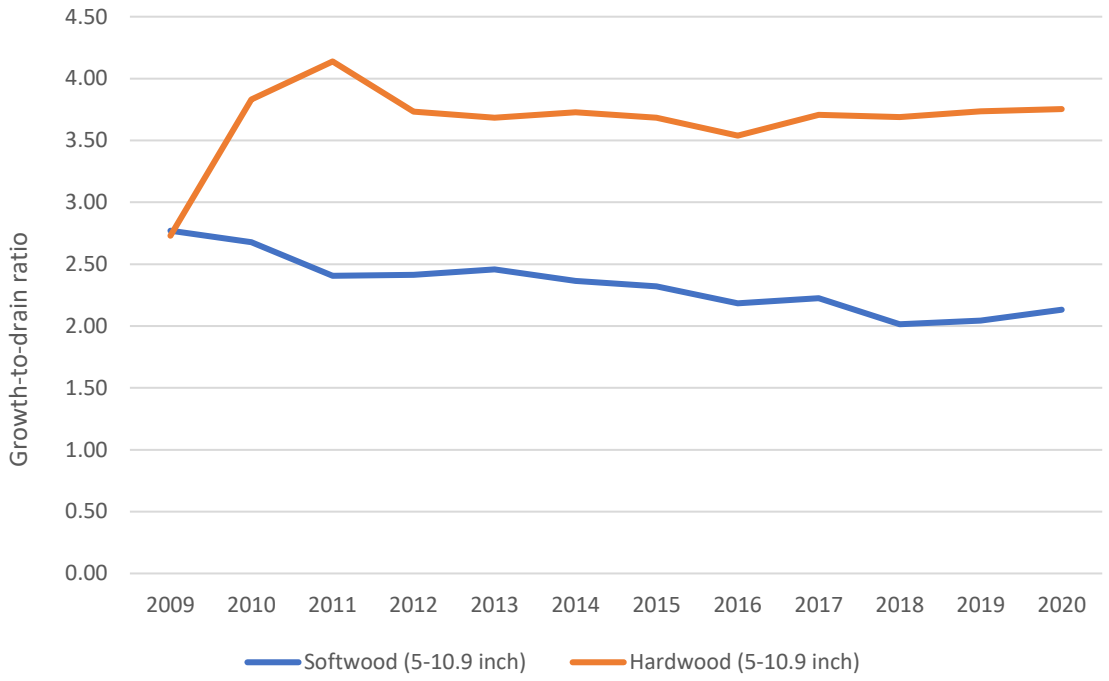
APPENDIX F: FUTURE COMPETITION

Table F-1. List of potential future competitors for feedstock within 200 mi drive distance from Natchez, MS

Company and location	Status	Product Type	Distance to Natchez, MS	Proposed Feedstock Intake (bdt/yr)	Percent overlap	Consumption impact (bdt/yr)
Velocys, **Natchez, MS**	Proposed	SAF	0	1,400,000	1.000	1,400,000
Louisiana Green Fuels (Strategic Biofuels) **Port of Columbia, LA**	Proposed	SAF / Renewable Diesel	72	500,000	0.558	279,000
Magnolia Renewable Fuels **Baton Rouge, LA**	Proposed	SAF / Renewable Diesel / Green Hydrogen	94	173,810	0.441	76,650
Gron Fuels **Baton Rouge, LA**	Proposed	SAF / Renewable Diesel / Green Hydrogen	94	1,000,000	0.441	441,000
Origin Materials **Geismar, LA**	Proposed	Green Materials	118	1,100,000	0.280	308,000
Enviva **Bond, MS**	Proposed	Wood Pellet	163	1,000,000	0.102	102,000
CM Biomass **Quitman, MS**	Under construction	Wood Pellet	188	150,000	0.019	2,850

APPENDIX G: GROWTH-TO-DRAIN RATIO

Figure G-1. Historical growth-to-drain ratio on private timberlands, by species group, 2009 to 2020



APPENDIX H: MODEL FOR SAWMILL RESIDUAL GENERATION

Sawmills

The following is the procedure used and associated assumptions made to estimate sawmill residue generation:

1. Facilities were categorized by dominant wood type, based on information available online.
2. Lumber production capacity of each facility was converted from volume (MMbfm per year) to weight (dry short tons per year):
    - Conversion factors taken from Forest Products Measurements and Conversion Factors
    - The conversion factor for mixed wood, W_M, is an unweighted average of conversion factors for hardwood, W_H and softwood, W_S
3. Lumber production capacity (dry short tons per year) was converted to maximum intake of timber (green short tons per year):
    - Conversions were done using Cubic Recovery Ratios (CRR) for estimated wood type:
        - Hardwood, CRR_H = 0.499 (one unit of hardwood timber input yields 0.499 units of hardwood lumber)
        - Softwood, CRR_S = 0.362 (one unit of softwood timber input yield 0.362 units of softwood lumber)
        - Mixed wood, CRR_M = 0.4305 (one unit of mixed timber input yields 0.4305 units of hardwood lumber) – this is an unweighted average of CRR_H and CRR_S
            - Conversion factors taken from Forest Products Measurements and Conversion Factors
4. Maximum residue generation of chips, sawdust, and bark was estimated by applying residue yield ratios to maximum timber intake for each facility, based on Fonseca (2005):
    - For softwood facilities:
        - Chip generation, $RR_{SC} = 35\%$ of raw softwood timber input
        - Sawdust generation, $RR_{SD} = 8.75\%$ of raw softwood timber input
        - Bark generation, $RR_{SS} = 5.2\%$ of raw softwood timber input
    - For hardwood facilities:
        - Chip generation, $RR_{HC} = 25\%$ of raw hardwood timber input
        - Sawdust generation, $RR_{HD} = 14\%$ of raw hardwood timber input
        - Bark generation, $RR_{HS} = 10.8\%$ of raw hardwood timber input
    - For facilities where species mix is unknown:
        - Chip generation, $RR_{MC} = 30\%$ of raw timber input
        - Sawdust generation, $RR_{MD} = 11.375\%$ of raw timber input
        - Bark generation, $RR_{MS} = 7.375\%$ of raw timber input

Formula to convert sawmill production capacities to estimated residue generation:

$$ERG = V_L * W_n * CRR_n * RR_n * A_n \quad (1)$$

Where:

- ERG – Estimated Residue Generation by Weight (gtpy)

- V_L – Lumber Production Capacity by Volume (MMbfm)
- W_n – Lumber Volume to Weight Conversion Factor
  - W_H=1680 st/MMbfm, W_S=974 st/MMbfm, W_M=1327 st/MMbfm
- CRR_n – Cubic Recovery Ratio
  - CRR_H=0.499, CRR_S=0.362, CRR_M=0.4305
- RR_{nm} – Residue Ratio
  - RR_{HC}=0.25, RR_{HD}=0.14, RR_{HS}=0.07
  - RR_{SC}=0.35, RR_{SD}=0.0875, RR_{SS}=0.0775
  - RR_{MC}=0.3, RR_{MD}=0.11375, RR_{MS}=0.07375
- A_n – Actual Lumber Production Adjustment Ratio
  - A_{Canada}=0.778, A_{USA}=0.915

APPENDIX I: MODEL FOR FOREST RESIDUE GENERATION

Harvest residues are calculated by estimating the weight of residues left in the forest after harvesting and applying a capture rate – i.e., the proportion of harvest residues estimated to be captured in the future. The weight of residues left in the forest after harvesting operations is equal, on average, to 14.3% of the total tree weight. Capture rate is harder to estimate as currently no studies are attempting to measure it. Therefore, for the purposes of this report, the potential availability of forest residues was calculated at a conservative capture rate of 25 %.

APPENDIX J: OTHER CHARTS AND FIGURES

Figure J-1: Regional Diesel Prices, 2018–2023

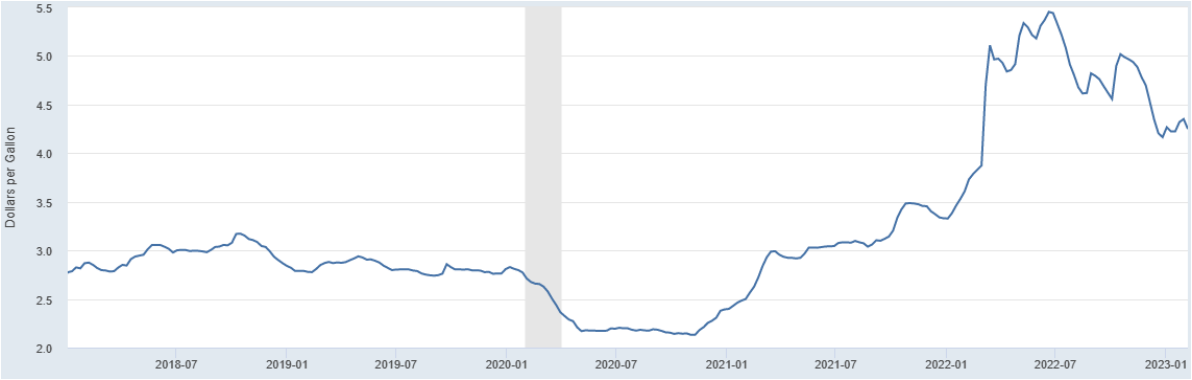
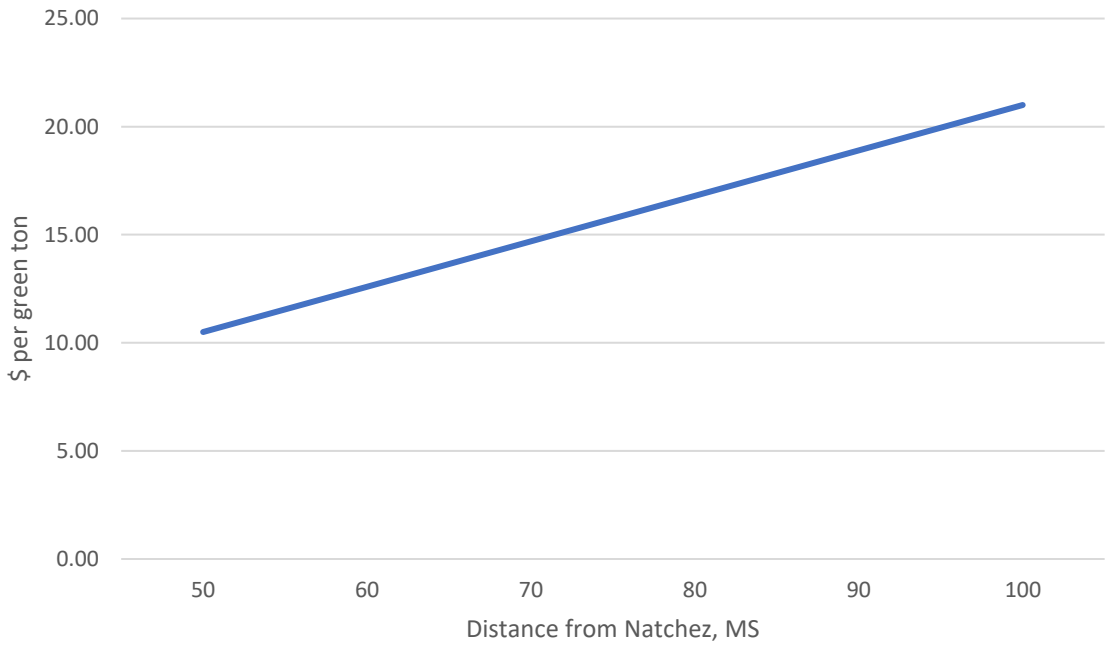


Figure J-2: Transport cost as a function of transport distance, $/gt, Q2 2022



APPENDIX K: LEGAL DISCLAIMER

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