MACON COUNTY, ALABAMA

Biofuel Opportunity Zone

RATING GRADE: 'A'

Date of Issue: January 31, 2025

A
High Quality

Rating Parameters:

Category	Rated Quantity	Delivered Price	Supply Zone Size
Pulpwood	877,000 bdt/yr	$60-$90/bdt	75-mi drive
Forest Residues	133,000 bdt/yr	$60-$80/bdt	distance from
Sawdust and Bark	46,000 bdt/yr	$60-$70/bdt	Tuskegee, Alabama

BDO ZONE ASSETS

- Growing forest industry due to large availability of sustainable and affordable sawtimber and pulpwood.
- Well-established forest supply chains with a proven track record of scale-up.
- Designated industrial site with prime access to rail services and highways, and the readily available essential physical and social infrastructure.

BDO ZONE LIABILITIES

- Large number of competitors with established relationships with existing suppliers of woody biomass.
- Aging logging industry and the need for large, skilled workforce to harvest the pulpwood rated quantity.
- Lack of sufficient log truck drivers to support the required scale-up of the forest supply chains.

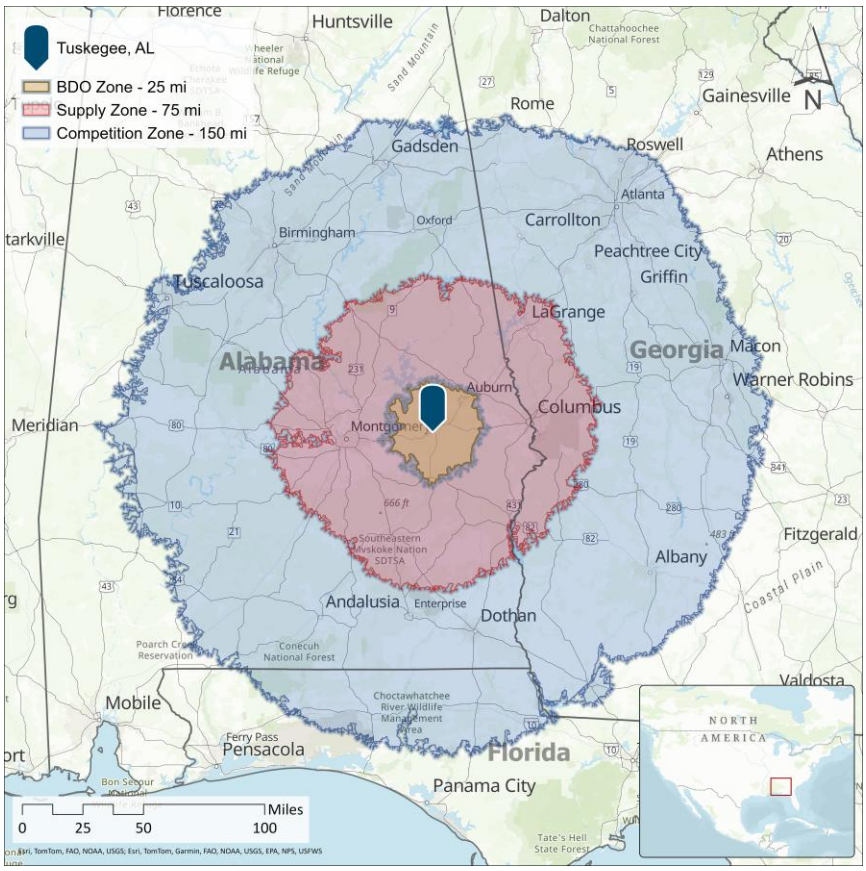
RATING GRADE

The Macon County, Biofuel Development Opportunity Zone, is rated 'A', or 'low' risk.

Risk Rating Grades are defined as follows: AAA (extremely low risk), AA (very low), A (low), BBB (low-moderate), BB (moderate), B (moderate-high), and C (high).

'A' ratings denote high prospective viability of Feedstock Supply and Infrastructure and low expectations of default risk in the Zone. Capacity to support new biobased plant operations is considered strong. This capacity may, nevertheless, be more vulnerable to the large number of competitors, and lack of sufficient logging crews and truck drivers than is the case for higher ratings.

MACON COUNTY BDO ZONE



BD|THE BIOFUEL DEVELOPMENT
OZ|OPPORTUNITY ZONE INITIATIVE

ANALYST NOTES

The primary source of available feedstock for future biomass projects is pulpwood. We estimate a potential of 877,000 bdt/yr of pulpwood can be economically and technically sourced at low risk. We expect that the low-risk pulpwood quantity would be available at a delivered price range of $60-$90/bdt. The low-risk quantity is estimated after considering pulpwood production and competition, supply chain constraints (e.g., equipment and labor availability, road capacity), and data/model uncertainty. The rated pricing is the expected delivered price that future biomass projects are likely to pay to secure the rated quantity.

The second source of available feedstock is forest residues. We estimate 133,000 bdt/yr of forest residues would be available at a low risk and a rated pricing of $60-$80/bdt.

Among the generated sawmill residue streams, we project only sawdust and bark would be available in large quantities for future biomass projects at the rated quantity of 46,000 bdt/yr and with a rated pricing of $60-70/bdt. Other sawmill residues, including wood chips, and wood shavings are mainly consumed by the sawmills for their internal energy needs and the existing large competitors. These competitors have established relationships with the sawmills, such as pulp and paper and wood pellets mills.

Among the 88 supply, competition, and infrastructure risk indicators evaluated, we found the large size of the competition for woody biomass, lack of sufficient logging crews and truck drivers, and the aging logging businesses as the primary risks that future biomass ventures need to mitigate. In contrast, the large availability of sustainable and affordable woody biomass and a growing forest industry accompanied by well-established supply chains are the BDO Zone assets.

A summary of main assets (very low/low risks) and liabilities (high risks) are discussed in the following sections.

BDO ZONE ASSETS

The Supply Zone is heavily forested, with 8.3 million acres of timberland, representing 74% of the total land area. This figure exceeds the Alabama average. There is a large timber inventory in the Supply Zone at nearly 220 million bdt. The timber inventory has expanded and is now more than double the level of twenty years ago. The average growth-to-drain ratio is estimated to be 2.0 (net growth twice the removal), an indication of the sustainability of pulpwood harvesting and silviculture operations in the Supply Zone.

A healthy inventory of pulpwood in the region has resulted in stable and low stumpage prices for pulpwood. The stumpage price for pine pulpwood and hardwood pulpwood was $8/bdt and $16/bdt, respectively for Macon County in Q3 2024. These prices are almost half of the average pulpwood stumpage prices in Alabama. Historical prices for pulpwood and sawmill residues show a relatively steady trend in the last ten years. In real terms, prices have been in a slight downward trend. Due to the supply and demand imbalance for pulpwood in the Supply Zone, these trends are expected to continue in the coming years.

The large availability of sustainable and affordable woody biomass, a favorable state corporate tax regime and workforce training and recruiting programs have resulted in the development of well-established supply chains and thriving primary and secondary forest industries. The sawmilling capacity in the Supply Zone more than doubled in the past decade. In 2024, 10 sawmills were operating with a production capacity of 1,238 MMBF. This capacity is projected to reach 1,438 MMBF in 2025 by the commissioning an under-construction sawmill (16% increase in the existing sawmilling capacity).

BDO ZONE LIABILITIES

There are 33 operating facilities using woody biomass as feedstock in the Competition Zone. Two new plants are also planned to be built in 2025. We estimate the total annual wood consumption of the operating and announced facilities to be about 23.9 million bdt. Five of the identified facilities are located in the Supply Zone, consuming about 3.5 million bdt of woody biomass annually. Most of these facilities are owned by established forest companies that have long-term relationships with the sawmills in the Supply Zone. Although we considered their demands in the calculation of the rated quantities, they can have a significant influence on the pulpwood and

sawmill residues availability and pricing. The establishment of biomass projects by one of the existing consumers or a joint venture with them will mitigate this risk. This is a probable scenario due to the existence of integrated forest companies that own sawmills and pulp and paper mills or sawmills and pellet mills.

Another major risk that needs to be mitigated is the availability of labor for both logging and transportation operations. A large number of operators would be needed to harvest and transport the rated quantities of pulpwood and forest residues (150 logging operators and 115 truck drivers).

There are concerns about the future expansion of the forest industry in the US Southeast due to the aging logging businesses. According to a survey that was conducted in 2023, the average age of logging business owners was 56, and the average age of employees was 48. About 35% of owners expected to exit the industry within five years, given current challenges, including increasing operating and equipment costs, and inadequate logging and trucking workforce recruitment. The availability of labor for feedstock production and transportation will be a high risk in the short and mid-term for large biomass projects.

Given the successful scale-up of the primary and secondary forest industries in the Supply Zone, we expect the labor shortage risk will be mitigated in the long term as new biomass projects develop in the Supply Zone. The state of Alabama has been proactive in recruiting and training new laborers for logging, trucking, and milling operations by establishing the ForestryWork organization and three universities and colleges that offer six forestry degree programs with more than 40 graduates annually.

INFRASTRUCTURE PROFILE

The 277-acre industrial site is strategically located at the exit 38 interchange of I-85, which offers prime access to major transportation routes. Its position within the Southeast Automotive Corridor, with proximity to both Atlanta and Montgomery/I-65, enhances its appeal to industries reliant on efficient transportation. The site is further distinguished by its designation as a CSX Select Site, one of only three in Alabama, which speaks to its readiness for industrial development. The designation criteria met by this site include:

- **Size**: Ample space for large-scale operations.
- **Rail Access**: Direct access to rail services, which is essential for cost-effective and timely distribution.
- **Proximity to Highways**: Immediate access to I-85, facilitating easy transportation across the region.
- **Workforce Availability**: Access to a skilled labor pool within the area.
- **Utilities**: Availability of natural gas, electricity, water, and wastewater services.
- **Environmental and Geo-Technical Standards**: Compliance with rigorous environmental and geotechnical criteria, ensuring the site is suitable for industrial development.

This combination of features makes the site well-suited for companies in the transportation and logistics sectors, particularly those involved in bio-industry fuels and feedstocks.

SCORING & RATING METHODOLOGY

In assessing the biomass supply chain risk for the Macon County BDO Zone, 88 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 evaluating feedstock risk within a BDO Zone, including:

- Twenty physical and social infrastructure risk indicators for an industrial park located in the BDO Zone. The BDO Zone is a 25-mile drive distance from the center point, Tuskegee. The BDO Zone represents the Siting Zone for future biomass projects and is where the industrial site is located.
- Ten supplier risk indicators, 46 supply chain risk indicators, and 2 feedstock scale-up risk indicators were assessed in the Supply Zone. The Supply Zone is a 75-mile drive distance from Tuskegee, where woody biomass availability was assessed.
- Ten competition risk indicators were evaluated in the Competition Zone. The Competition Zone is a 150-mile drive from Tuskegee, where consumers can compete for feedstock generated in the Supply Zone.

Feedstock quantities are expressed in bone-dry tons per year (bdt/yr), while feedstock costs are expressed in USD ($). Maximum transport distance is based on a 75-mile driving distance from the center point (Tuskegee).

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 Risk Likelihood (RRL)** score, which denotes the likelihood of a risk to future BDO Zone projects due to the Risk Indicator. RRL Scores are scaled as either very low (2), low (4), medium (6), high (8), or very high (10).

Each BDO Zone Risk Indicator is given a **Raw Risk Impact (RRI)** score, which denotes the impact on a future BDO Zone project due to the Risk Indicator. RRI scores are scaled as either very low (2), low (4), medium (6), high (8), or very high (10). Impact level scores are based on the impact level of a risk on the successful development and deployment of a BDO Zone project with no mitigation measures.

The **Gross Risk Indicator (GRI)** score is then calculated as the product of the RRL and the RRI scores. For example, if the 'Competitor Price and Price Sensitivity' is scored at an RRL of 2 and an RRI of 8, then the GRI for this risk indicator is 2 X 8 = 16.

If the analyst deems that a typical bio-based project could implement economically reasonable measures or best practices that mitigate the likelihood (RRL), the impact (RRI), or both, then the GRI will be notched accordingly.

The **Loaded RI** score for each Risk Indicator is the product of the GRI score and any notched scores. Loaded RIs are the final score for a Risk Indicator.

Loaded RI scores of 4 or less are deemed very low risk; scores between 5 and 16 are deemed low risk; scores between 17 and 36 are deemed medium risk; scores between 37 and 64 are deemed high risk; and scores of 65 and greater are deemed very high risk.

The total risk rating for the BDO Zone is the average of all Loaded RI scores and Infrastructure Indicators. The BDO Zone score for Macon County is ***19.33 out of 100, resulting in an 'A' designation.***

All scoring and rationale for each Risk Indicator are provided in Section D.

PROJECT TEAM

PROJECT DIRECTOR

Mahmood Ebadian
Director of Advisory Services
Ecostrat Inc.
mahmood@ecostrat.com

TECHNICAL CONTACT

Marcin Lewandowski
Senior Director, Operations & Risk
Ecostrat Inc.
marcin@ecostrat.com

BUSINESS CONTACT

Jordan R. Solomon
President & CEO
Ecostrat Inc.
jordan.solomon@ecostrat.com

SECTION A: RISK INDICATOR SUMMARY

Figure A-1. All Risk Indicators Sorted by Risk Level

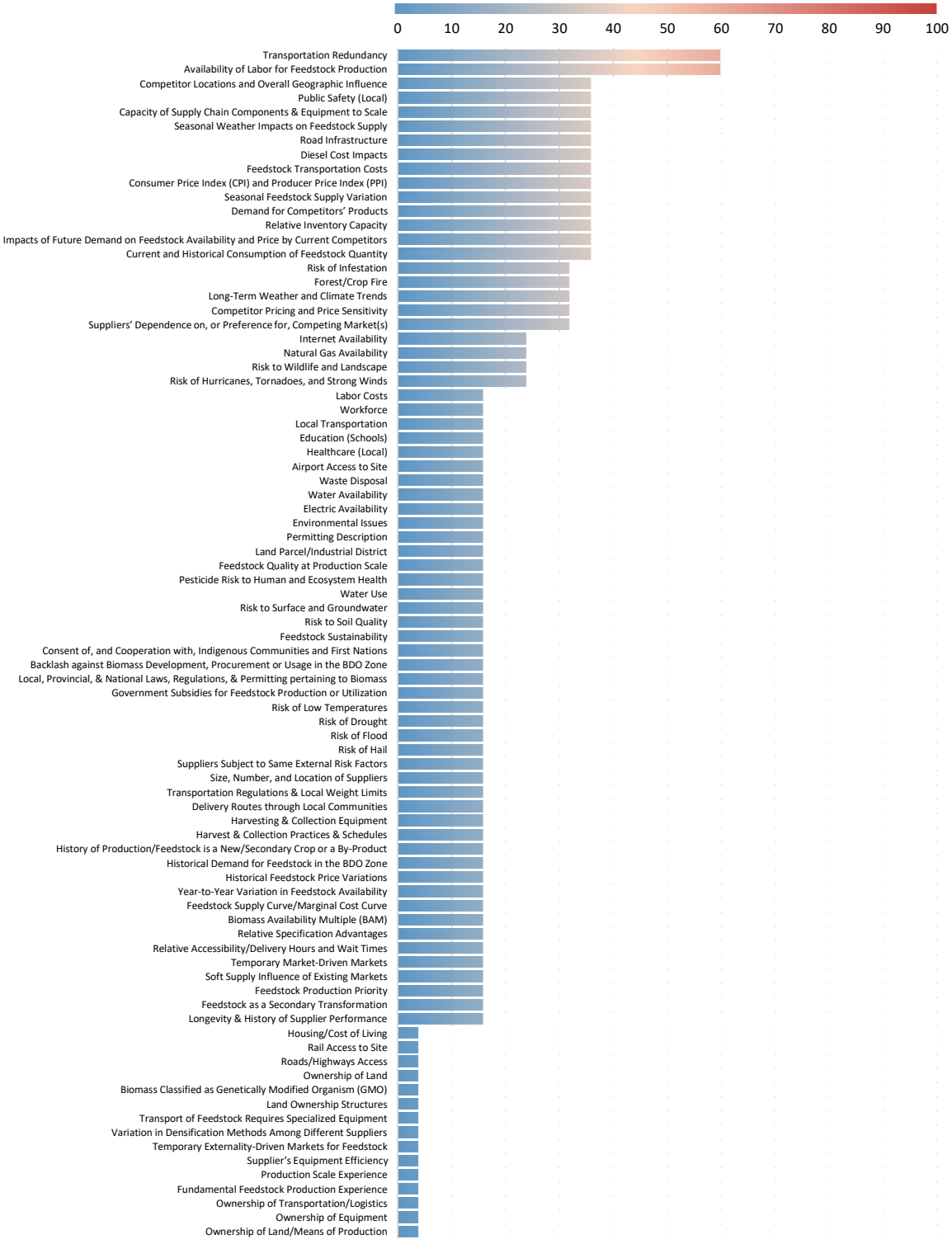


Table A-1. Risk Indicators and Associated Scores

Feedstock Supply Chain Risk Indicators	Raw Risk Likelihood	Raw Risk Impact	Gross Risk Indicator	Mitigation /Notching	Loaded RI Score
Category 1.0: Supplier Risk					
1.1 Risk Factor: Credit-Worthiness/Future Solvency of Suppliers					
1.1.1 Longevity & History of Supplier Performance	4	4	16	NN	16
1.2 Risk Factor: Conflicts of Interest/Vested Interest with Competing Market(s)					
1.2.1 Suppliers' Dependence on, or Preference for, Competing Market(s)	8	8	64	50%	32
1.3 Risk Factor: Supplier Control Over Production and Transportation					
1.3.1 Ownership of Land/Means of Production	2	2	4	NN	4
1.3.2 Ownership of Equipment	2	2	4	NN	4
1.3.3 Ownership of Transportation/Logistics	2	2	4	NN	4
1.3.4 Feedstock as a Secondary Transformation	4	4	16	NN	16
1.4 Risk Factor: Supplier Experience					
1.4.1 Fundamental Feedstock Production Experience	2	2	4	NN	4
1.4.2 Production Scale Experience	2	2	4	NN	4
1.5 Risk Factor: Supplier Harvesting/Collection/Processing Capacity					
1.5.1 Supplier's Equipment Efficiency	2	2	4	NN	4
1.6 Risk Factor: Supplier Motivation					
1.6.1 Feedstock Production Priority	4	4	16	NN	16
Category 2.0: Competitor Risk					
2.1 Risk Factor: Influence on Feedstock Supply of Existing Markets					
2.1.1 Competitor Locations and Overall Geographic Influence	8	6	48	25%	36
2.1.2 Current and Historical Consumption of Feedstock Quantity	6	6	36	NN	36
2.1.3 Competitor Pricing and Price Sensitivity	4	8	32	NN	32
2.1.4 Impacts of Future Demand on Feedstock Availability and Price by Current Competitors	6	6	36	NN	36
2.1.5 Soft Supply Influence of Existing Markets	4	4	16	NN	16
2.1.6 Temporary Market-Driven Markets	4	4	16	NN	16
2.2 Risk Factor: Specific Competitors' Competitive Advantage					
2.2.1 Relative Inventory Capacity	6	6	36	NN	36
2.2.2 Relative Accessibility/Delivery Hours and Wait Times	4	4	16	NN	16
2.2.3 Relative Specification Advantages	4	4	16	NN	16
2.2.4 Demand for Competitors' Products	6	6	36	NN	36
Category 3.0: Supply Chain Risk					
3.1 Risk Factor: Feedstock Availability					
3.1.1 Biomass Availability Multiple (BAM)	4	4	16	NN	16
3.1.2 Feedstock Supply Curve/Marginal Cost Curve	4	4	16	NN	16
3.1.3 Seasonal Feedstock Supply Variation	6	6	36	NN	36
3.1.4 Year-to-Year Variation in Feedstock Availability	4	4	16	NN	16
3.2 Risk Factor: Historical Issues					
3.2.1 Historical Feedstock Price Variations	4	4	16	NN	16
3.2.2 Low Historical Demand for Feedstock in the BDO Zone	4	4	16	NN	16
3.2.3 History of Production/Feedstock is a New/Secondary Crop or a By-Product	4	4	16	NN	16
3.3 Risk Factor: Non-Weather Based Externalities					
3.3.1 Consumer Price Index (CPI) and Producer Price Index (PPI)	6	6	36	NN	36
3.3.2 Currency Risk	NR	NR	NR	NR	NR
3.3.3 Border Risk	NR	NR	NR	NR	NR
3.3.4 Temporary Externality-Driven Markets for Feedstock	2	2	4	NN	4
3.4 Risk Factor: Risks Related to Feedstock Production, Harvest, and Collection					
3.4.1 Harvest & Collection Practices & Schedules	4	4	16	NN	16
3.4.2 Harvesting & Collection Equipment	4	4	16	NN	16
3.4.3 Variation in Densification Methods Among Different Suppliers	2	2	4	NN	4
3.4.4 Availability of Labor for Feedstock Production	10	6	60	NN	60
3.5 Risk Factor: Transportation					
3.5.1 Feedstock Transportation Costs	6	6	36	NN	36
3.5.2 Diesel Cost Impacts	6	6	36	NN	36
3.5.3 Transport of Feedstock Requires Specialized Equipment	2	2	4	NN	4
3.5.4 Delivery Routes through Local Communities	4	4	16	NN	16
3.5.5 Transportation Regulations & Local Weight Limits	4	4	16	NN	16
3.5.6 Road Infrastructure	6	6	36	NN	36
3.5.7 Transportation Redundancy	10	6	60	NN	60
3.6 Risk Factor: Supply Chain Resiliency					

3.6.1 Size, Number, and Location of Suppliers	4	4	16	NN	16
3.6.2 Suppliers Subject to Same External Risk Factors	4	4	16	NN	16
3.6.3 Land Ownership Structures	2	2	4	NN	4
3.7 Risk Factor: Climate and Natural Risks					
3.7.1 Seasonal Weather Impacts on Feedstock Supply	6	6	36	NN	36
3.7.2 Long-Term Weather and Climate Trends	8	4	32	NN	32
3.7.3 Forest/Crop Fire	8	4	32	NN	32
3.7.4 Risk of Infestation	8	4	32	NN	32
3.7.5 Risk of Hail	4	4	16	NN	16
3.7.6 Risk of Flood	4	4	16	NN	16
3.7.7 Risk of Drought	4	4	16	NN	16
3.7.8 Risk of Hurricanes, Tornadoes, and Strong Winds	6	4	24	NN	24
3.7.9 Risk of Low Temperatures	4	4	16	NN	16
3.8 Risk Factor: Political and Social					
3.8.1 Government Subsidies for Feedstock Production or Utilization	4	4	16	NN	16
3.8.2 Local, Provincial, & National Laws, Regulations, & Permitting pertaining to Biomass	4	4	16	NN	16
3.8.3 Backlash against Biomass Development, Procurement or Usage in the BDO Zone	4	4	16	NN	16
3.8.4 Consent of, and Cooperation with, Indigenous Communities and First Nations	4	4	16	NN	16
3.8.5 Food Security Concerns	NR	NR	NR	NR	NR
3.9 Risk Factor: Sustainability and Environmental Concern					
3.9.1 Feedstock Sustainability	4	4	16	NN	16
3.9.2 Risk to Soil Quality	4	4	16	NN	16
3.9.3 Risk to Surface and Groundwater	4	4	16	NN	16
3.9.4 Water Use	4	4	16	NN	16
3.9.5 Pesticide Risk to Human and Ecosystem Health	4	4	16	NN	16
3.9.6 Risk to Wildlife and Landscape	6	4	24	NN	24
3.9.7 Biomass Classified as Genetically Modified Organism (GMO)	2	2	4	NN	4
Category 4.0: Feedstock Scale-up Risk					
4.1 Risk Factor: Feedstock Scale-Up					
4.1.1 Feedstock Quality at Production Scale	4	4	16	NN	16
4.1.2 Capacity of Supply Chain Components & Equipment to Scale	6	6	36	NN	36
Category 5.0: Infrastructure					
5.1 Risk Factor: Physical Infrastructure					
5.1.1 Land Parcel/Industrial District	4	4	16	NN	16
5.1.2 Ownership of Land	2	2	4	NN	4
5.1.3 Permitting Description	4	4	16	NN	16
5.1.4 Environmental Issues	4	4	16	NN	16
5.2 Risk Factor: Utilities					
5.2.1 Natural Gas Availability	4	6	24	NN	24
5.2.2 Electric Availability	4	4	16	NN	16
5.2.3 Water Availability	4	4	16	NN	16
5.2.4 Waste Disposal	4	4	16	NN	16
5.2.5 Internet Availability	4	6	24	NN	24
5.3 Risk Factor: Transportation/Logistics					
5.3.1 Roads/Highways Access	2	2	4	NN	4
5.3.2 Rail Access to Site	2	2	4	NN	4
5.3.3 Airport Access to Site	4	4	16	NN	16
5.3.4 Water Freight Access	NR	NR	NR	NR	NR
5.4 Risk Factor: Social Infrastructure					
5.4.1 Healthcare (Local)	4	4	16	NN	16
5.4.2 Education (Schools)	4	4	16	NN	16
5.4.3 Local Transportation	4	4	16	NN	16
5.4.4 Public Safety (Local)	6	6	36	NN	36
5.4.5 Housing/Cost of Living	2	2	4	NN	4
5.5 Risk Factor: Labor					
5.5.1 Workforce	4	4	16	NN	16
5.5.2 Labor Costs	4	4	16	NN	16
				Average	**19.33**

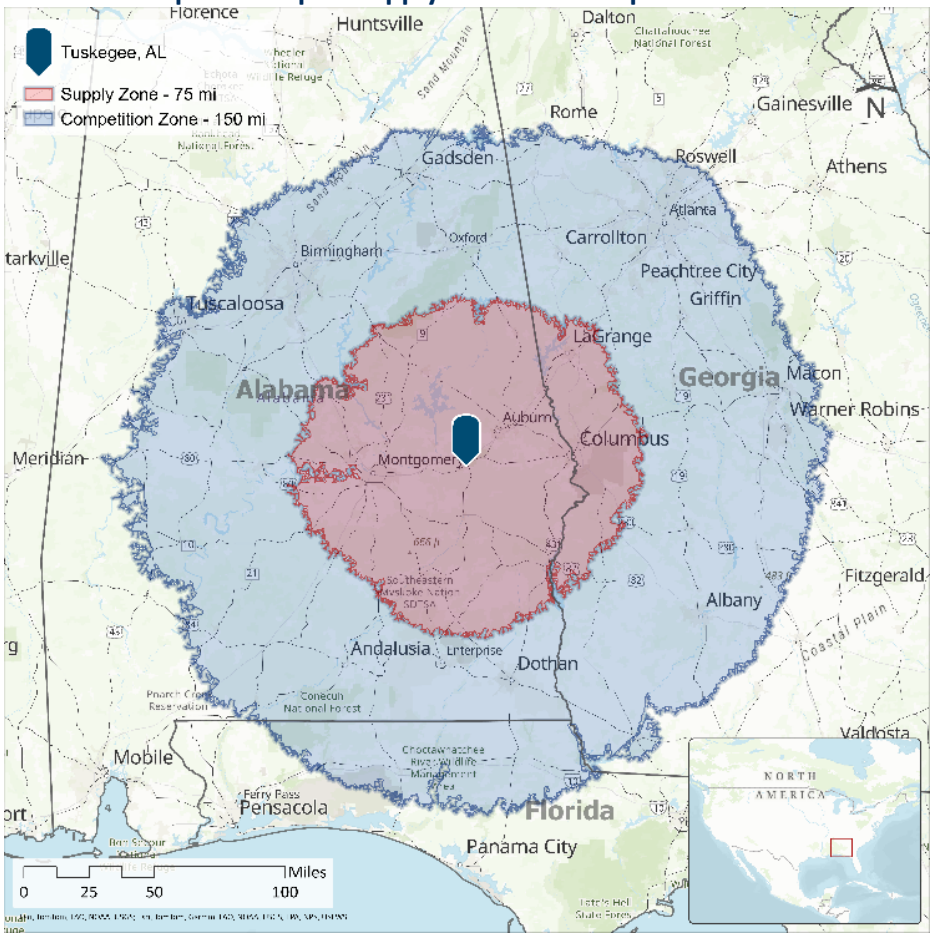
SECTION B: BIOMASS AVAILABILITY AND PRICING

OVERVIEW

In this section, we evaluate the rated quantity and pricing for woody biomass for the Macon County BDO Zone, with the center point of Tuskegee, Alabama (AL), the United States. We estimate the rated quantity as the low-risk quantity after considering current supply and competition, supply chain constraints (e.g., operational, accessibility, and market dynamics), and data/model uncertainty. To reach a low-risk quantity, after estimating the biomass availability (supply-demand), we apply a Biomass Availability Multiple (BAM)[1] that ensures a degree of biomass supply redundancy in relation to the rated quantity. BAM is intended to capture the uncertainty associated with underlying data, assumptions, timber growth and removal, and future operating conditions for new biomass projects. The rated pricing is the expected price that future biomass projects are likely to pay to secure the rated quantity.

The Macon Supply Zone is delineated by a 75-mile drive distance from the City of Tuskegee, where woody biomass availability is assessed. The Competition Zone refers to the geographic area from which the existing woody biomass consumers can influence its availability within a 150-mi drive distance. Map B-1 below shows the overlay of the Supply Zone and Competition Zone.

Map B-1. Map of Supply Zone and Competition Zone



[1] BAM is valued between 1.5 and 4.0 based on the level of uncertainty associated with the information used in the analysis of supply, competition, and availability, and future operating conditions.

The Supply Zone is heavily forested, with 8.3 million acres of timberland, representing 74% of the total land area. This figure exceeds the Alabama average. Over 94% of the timberland areas in the Supply Zone are privately owned. Approximately 4% are held by the federal government and 2% by state and local governments. This ownership pattern is highly favorable with respect to accessing open-market timber and biomass for industrial purposes.[2]

There is a large timber inventory in the Supply Zone at nearly 432 million green tons (about 220 million bdt).[3] Approximately 58%, or 248 million green tons (125 million bdt), are softwoods, of which 99.5% are Southern pines and 42% are mixed hardwood species. Over the past twenty years, the pine timber inventory volume in the Supply Zone has steadily grown, over 83% larger than in the year 2000. The sawtimber component of the inventory has expanded even more rapidly and is now more than double the level of twenty years earlier. It is expected that the pine inventory volume will continue to expand for the foreseeable future.[4]

EVALUATED FEEDSTOCKS

Three types of woody biomass are evaluated:

Pulpwood: Standing/harvested timbers that are not big enough or of a high enough quality to be used for high-value merchantable forest products such as lumber, poles, and plywood. Pulpwood is used to manufacture engineered forest products such as Oriented Strand Board (OSB) and fiber-based products such as paper, absorbent pulp, cardboard, and fiberboard. Pulpwood has also been used as feedstock in the production of wood pellets in the last two decades.

Forest residues: Forest residues refer to the by-product or leftover material resulting from forestry operations, such as timber harvesting and thinning. This feedstock typically consists of branches, tops, and other woody debris that remain on-site after the primary timber has been extracted. Forest residues differ from whole tree chip as the roundwood or log portion of the tree is not included.

Sawmill residues: Byproduct of sawmill operations, produced from conversion of sawlogs into finished wood products such as lumber and engineered wood. A typical lumber mill converts approximately 40%-60% of sawlogs into finished wood products (i.e., lumber). The remaining portion of sawn timber is transformed into sawmill residues, including wood chips, sawdust, shavings, and bark.

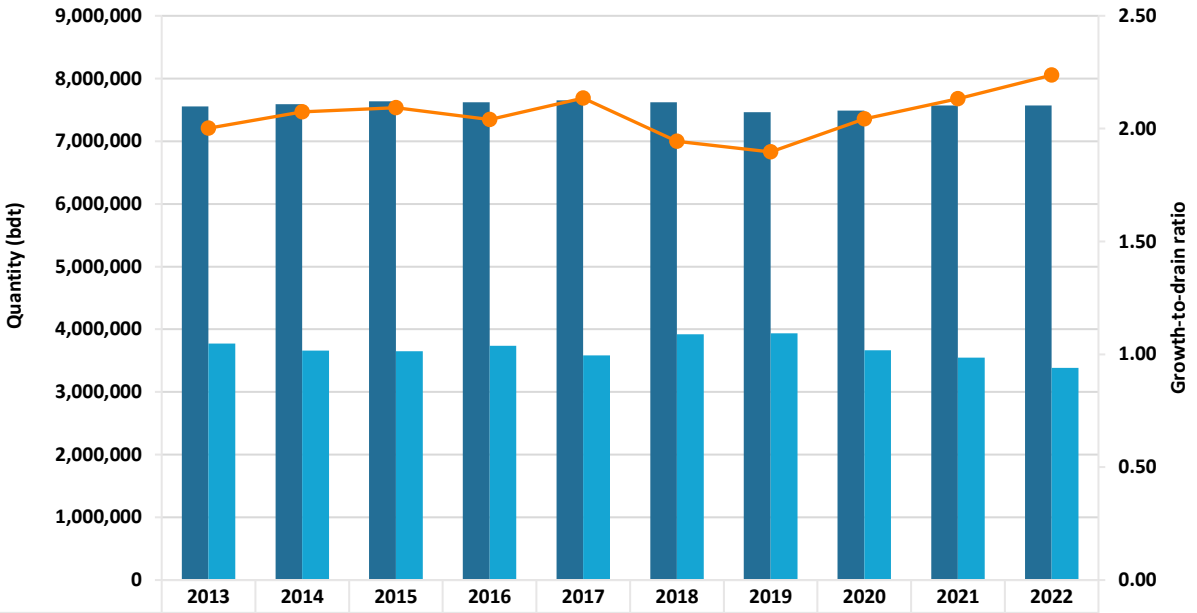
SUPPLY ANALYSIS

Pulpwood and forest residues

We estimate the potential availability of pulpwood and forest residues using the USDA Forest Service FIA Program.[5] The historical net growth and removal of pulpwood over the period of 2013-2022 are illustrated in Figure B-1. The average growth-to-drain ratio is estimated to be 2 (net growth twice the removal), an indication of the sustainability of pulpwood harvesting and silviculture operations in the Supply Zone. The difference between the average pulpwood net growth (7,580,000 bdt) and removal (3,690,000 bdt) is 3,890,000 bdt. This is the total available pulpwood for harvesting. However, to ensure sustainable removal, we assume at least a growth-to-drain ratio of 1.2 needs to be met after removing additional pulpwood, meaning that approximately 2,630,000 bdt would be available for future biomass projects.

[2] Southern Pine Resource Analysis for Lumber Production Tuskegee, Alabama Drain Area. Prepared by K. J. Muehlenfeld & Associates, 2020
[3] Moisture content of standing timbers is assumed to be 50% wet basis (w.b.)
[4] Southern Pine Resource Analysis for Lumber Production Tuskegee, Alabama Drain Area. Prepared by K. J. Muehlenfeld & Associates, 2020
[5] The Forest Inventory and Analysis (FIA) program of the USDA Forest Service Research and Development Branch collects, processes, analyzes, and reports on data necessary for assessing the extent and condition of forest resources in the United States.

Figure B-1. Average annual pulpwood net growth and removal, 2013-2022



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Average annual net growth	7,554,771	7,588,943	7,635,385	7,621,376	7,649,134	7,621,220	7,461,784	7,487,894	7,571,537	7,568,139
Average annual harvest removals	3,772,759	3,659,539	3,648,066	3,735,531	3,582,501	3,921,208	3,933,778	3,663,906	3,549,380	3,382,980
Growth-to-Drain Ratio	2.00	2.07	2.09	2.04	2.14	1.94	1.90	2.04	2.13	2.24

The historical production of forest residues in the last 10 years is shown in Figure B-2. The small variation in forest residue generation is an indication of stable demand for sawtimber by the sawmill industry in the Supply Zone. On average, we estimate 530,000 bdt of forest residues have been produced annually. However, the utilization of forest residues has been very limited since there is a sufficient supply of pulpwood and sawmill residues to meet the demand of the existing end users. The removal of forest residues from logging sites requires investment in grinding equipment, chip van trucks, sharing landings and roads with sawtimber and pulpwood supply chains. Currently, there is no strong driver for the logging companies to invest in forest residue supply chains unless there is a long-term solid and lucrative demand for this material.

Figure B-2. Estimated generation of forest residues in the Supply Zone, 2013-2022

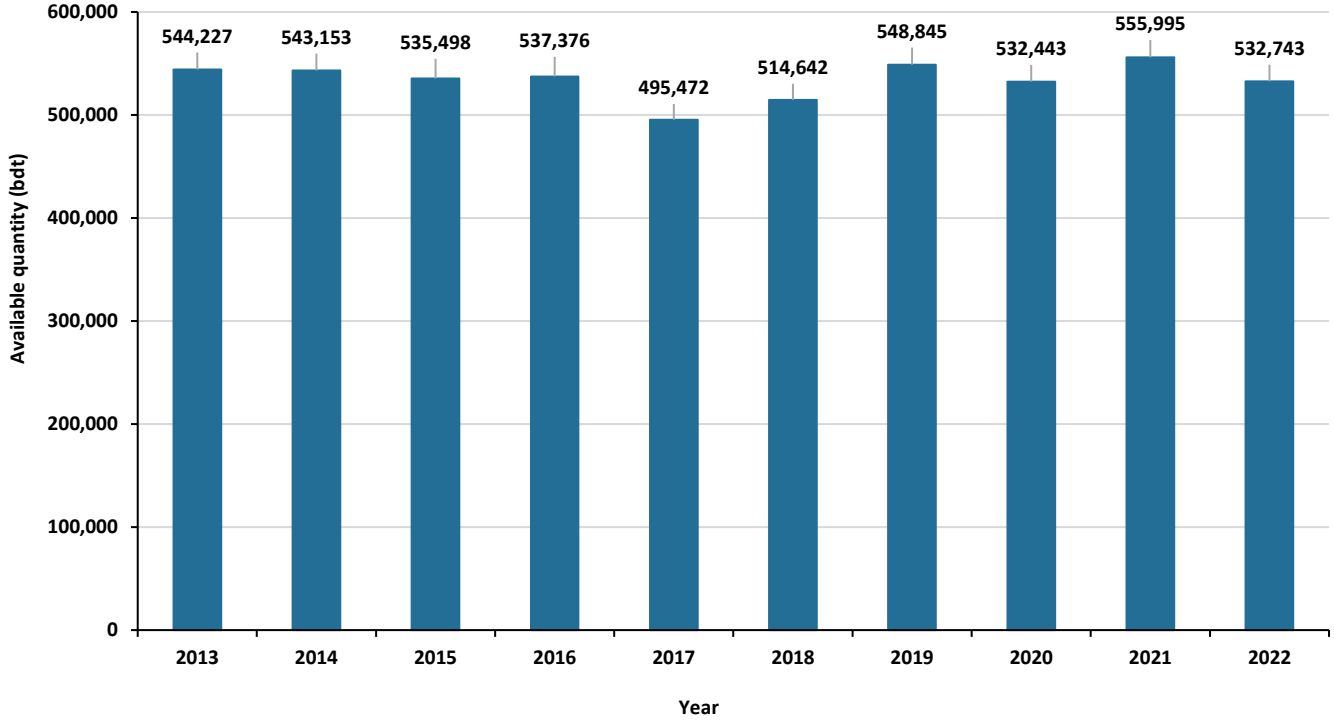
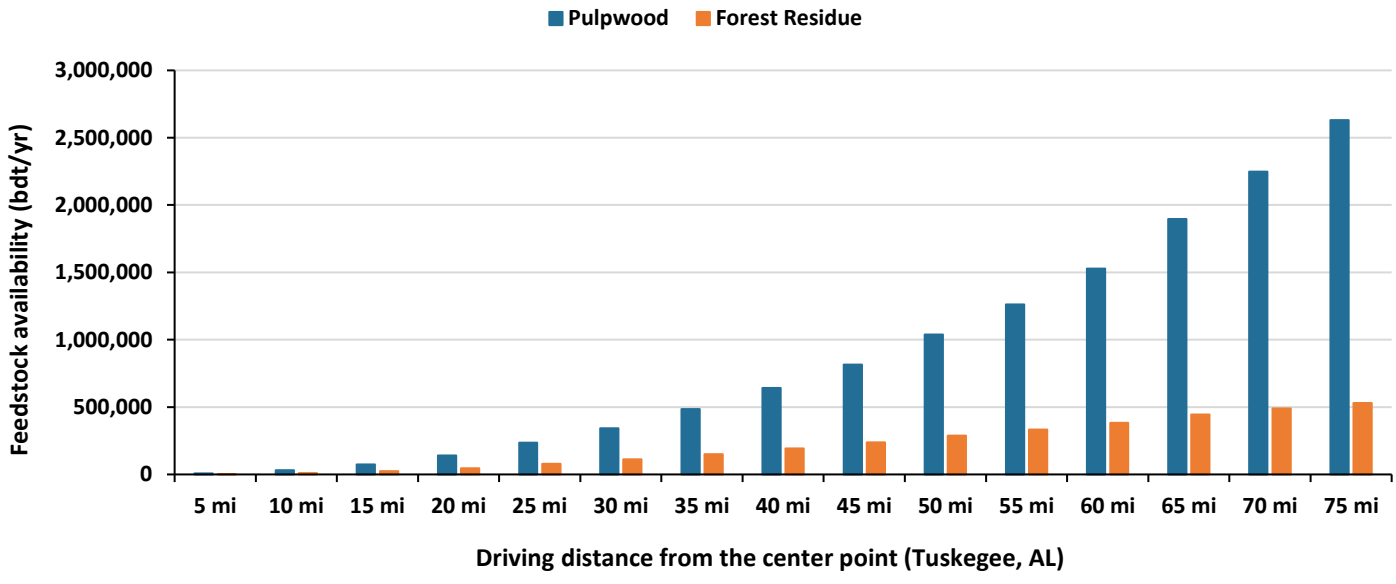


Figure B-3 shows the supply curve for the potential availability of pulpwood and forest residues for 5-mile drive distance increments. For pulpwood, about 40% of this potential quantity is available within a 50-mile driving distance of the center point (Tuskegee). For forest residues, about 55% of the potential quantity is available within a 50-mile driving distance.

Figure B-3. Supply curve for the potential availability of pulpwood and forest residues in the Supply Zone



Sawmill residues

There are thirteen sawmills within the Supply Zone (see Map B-2). One of them was forced to shut down in 2023 by the regulators due to fire code and safety violations. Another sawmill was closed in 2024. It was a small sawmill (7 million Board Feet (MMBF) that had an insignificant impact on the sawmill residues supply and demand in the Supply Zone. In contrast, a new large sawmill with an annual sawmilling capacity of 200 MMBF is planned to be in operation in 2025.

Map B-2. Location of sawmills in the Supply Zone

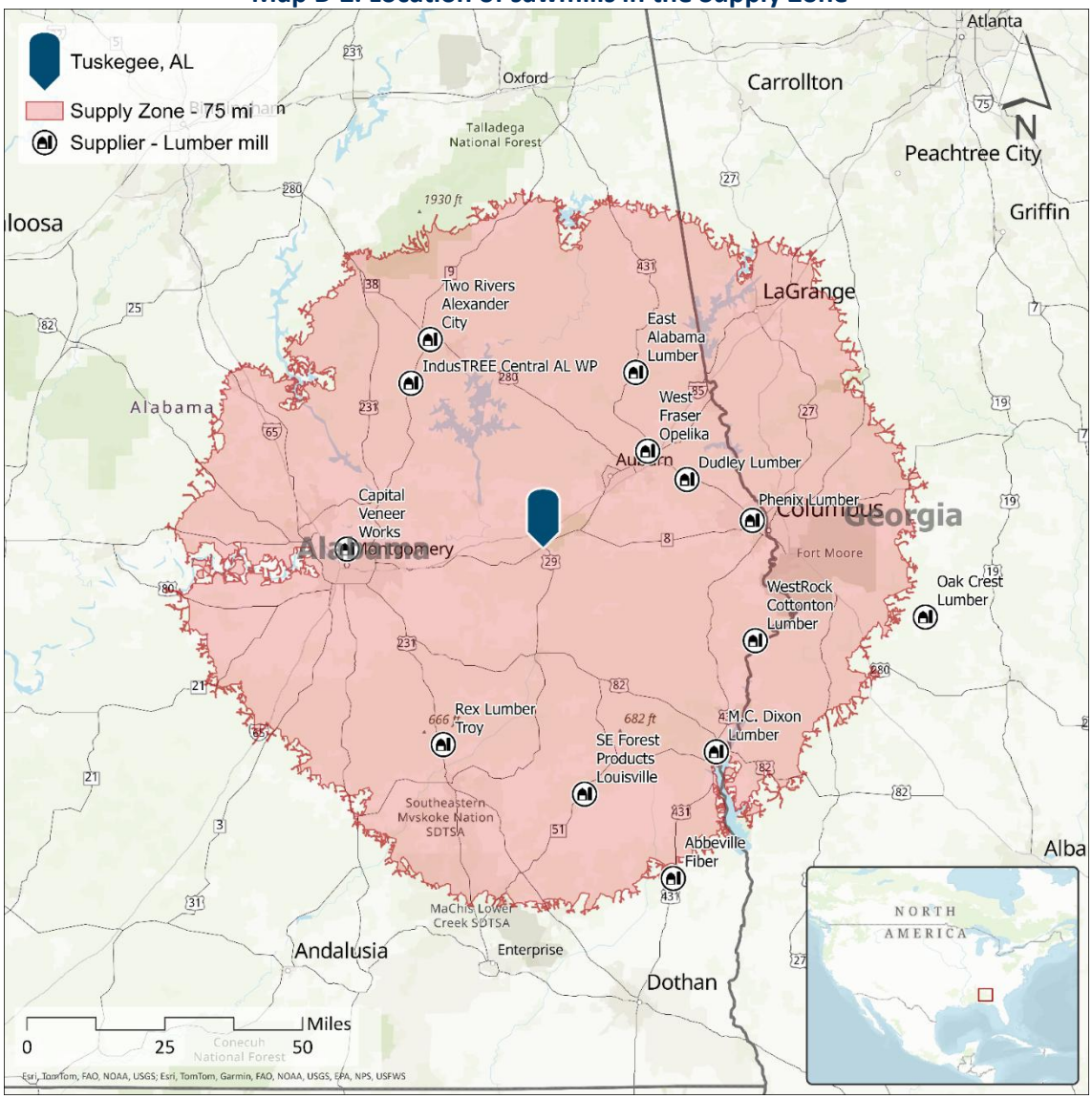
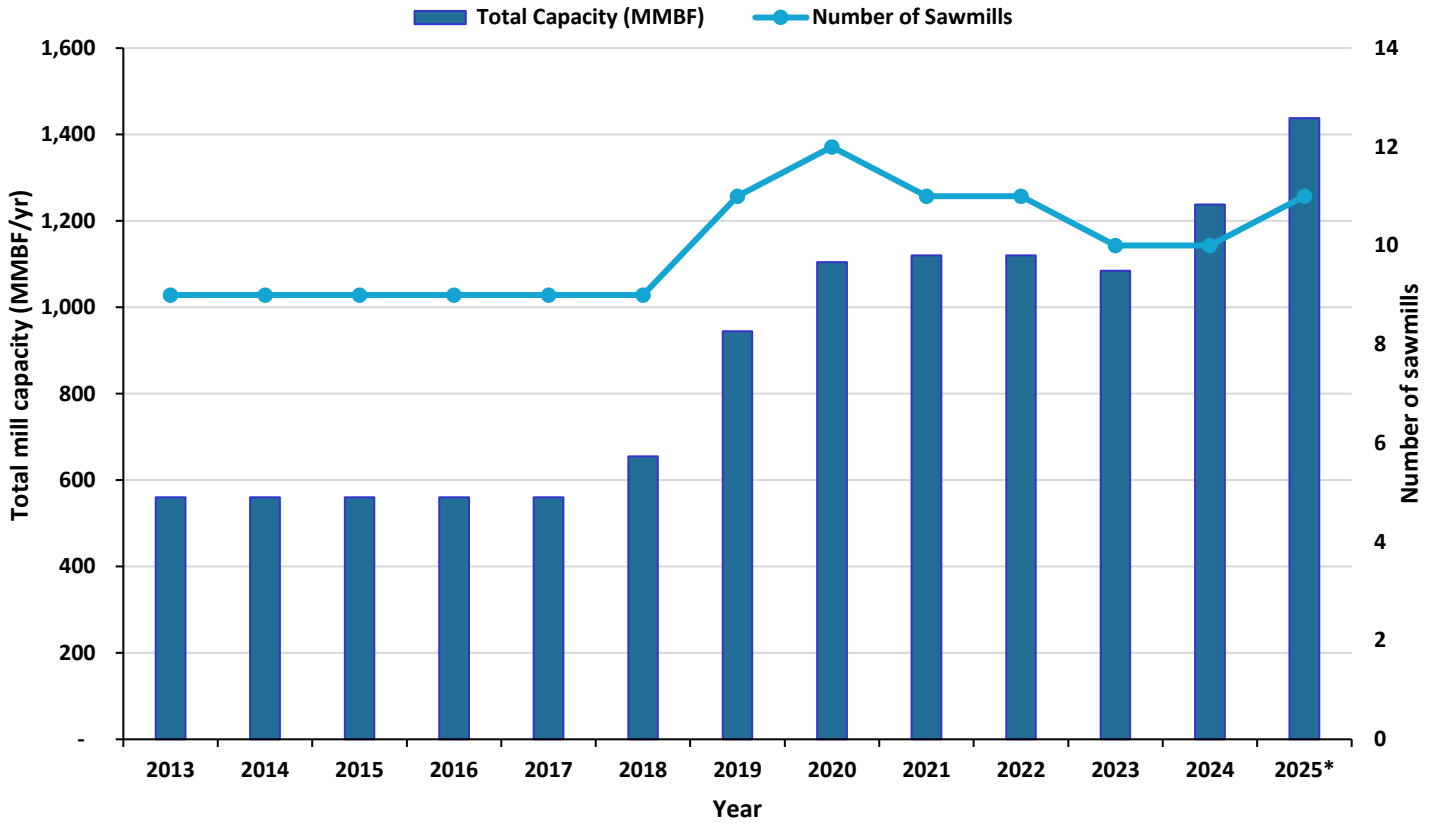


Figure B-4 shows the changes in the number of operating sawmills and their production capacity. As shown in Figure B-4 and confirmed by the local experts, the Supply Zone has experienced an increase in the sawmilling production capacity in the last decade. This is due to the abundance of sustainable and affordable timber supply, a favorable corporate tax environment in the state of Alabama[6] for the manufacturing industry, and other supports such as training and recruiting logging, trucking, and milling workforce by the ForestryWork organization. In 2024, 10 sawmills were operating with a

[6] Alabama Department of Revenue, Tax Incentives

combined production capacity of 1,238 MMBF. With the addition of the new sawmill in 2025, the total capacity is projected to reach 1,438 MMBF (16% increase in the sawmilling capacity). Total sawtimber demand by these sawmills is estimated to be 6,346,000 tons (around 3,173,000 bdt assuming 50% moisture content).[7]

Figure B-4. Number of operating sawmills and their production capacity in the Supply Zone, 2013-2025



* 2025 is the projected capacity

With the projected sawmilling capacity in 2025, we estimate the total production of sawmill residues to be 1,793,000 bdt. Table B-1 shows the breakdown of the estimated quantity of sawmill residues being produced in the Supply Zone. It is noteworthy that Table B-1 shows the total generation and not the potential amount available for future biomass projects. The rated quantity of sawmill residues is estimated after the competition assessment discussed in the next section.

Table B-1. Estimated sawmill residues generation in the Supply Zone

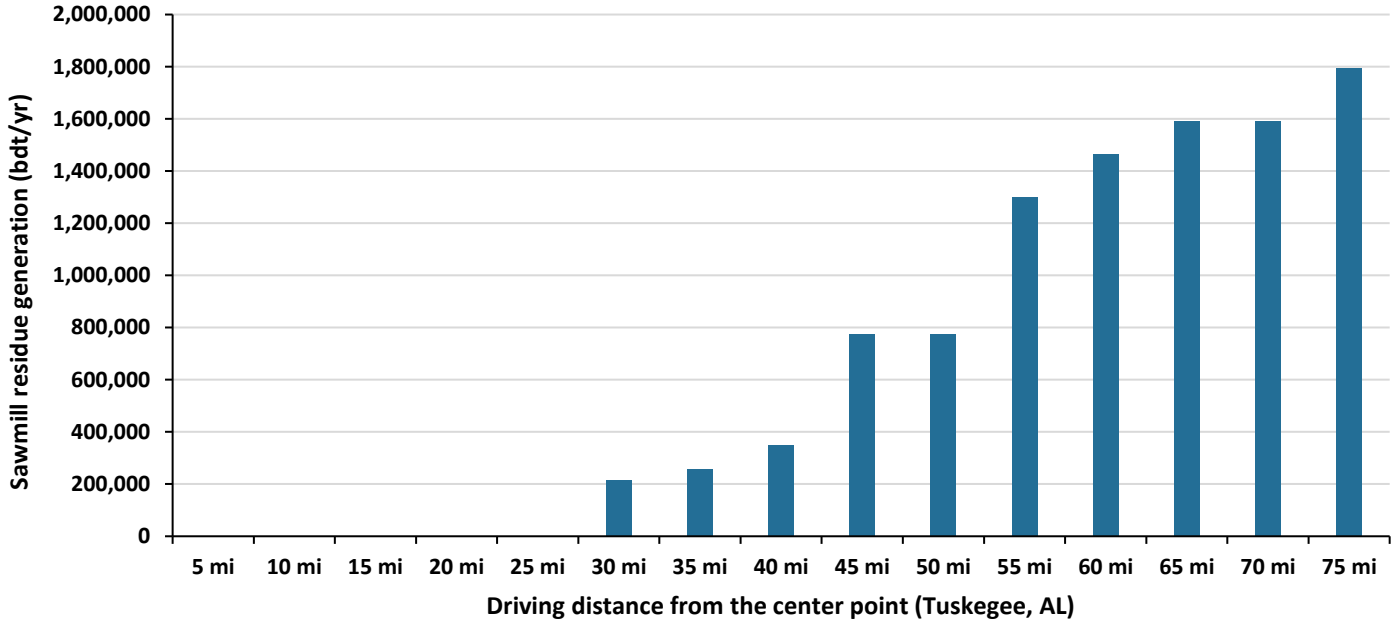
Sawmill residue type	Estimated annual generation (bdt/yr)
Wood chips	1,047,000
Sawdust	159,000
Wood shavings	222,000
Bark	365,000
Total	**1,793,000**

Figure B-5 illustrates the supply curve for the annual sawmill residues generated. There is no production of sawmill residues in the first 30-mile driving distance. About 43% of sawmill residues are generated in the driving distance of 50

[7] FORISK North American Mill Capacity Database

miles, and the rest is available in the driving distance of 50-75 miles from the center point (Tuskegee), where most of the sawmills are located.

Figure B-5. Supply curve of sawmill residues in the Supply Zone



COMPETITION ANALYSIS

The large consumers of woody biomass in the Competition Zone are:

- **Pulp and paper mills**: There are thirteen operating mills and a newly announced facility. The new facility will produce corrugated boxes using 100% recycled containerboard as feedstock. Thus, it does not impact the woody biomass supply in the Supply Zone.
- **Oriented Strand Board (OSB) mills:** There are three operating OSB mills and a newly announced facility planned to be in operation in 2025.
- **Wood pellet mills:** There are currently five operating mills. A black pellet facility that was in operation from 2015-2020 was shut down and dismantled in 2021.
- **Bioenergy plants:** There are twelve bioenergy facilities that use woody biomass for heat/power generation.

It is noted that there are four Engineered Wood Products (EWP) mills in the Supply Zone that use lumber and/or sawtimbers as feedstock. Thus, they are not considered as competitors in this risk rating analysis.

In total, there are 33 operating facilities using woody biomass as feedstock. Two new plants are also planned to be built in the Competition Zone. Out of which, five facilities are located in the Supply Zone. These facilities are shown in Map B-3

Map B-3. Location of woody biomass end users in the Competition Zone

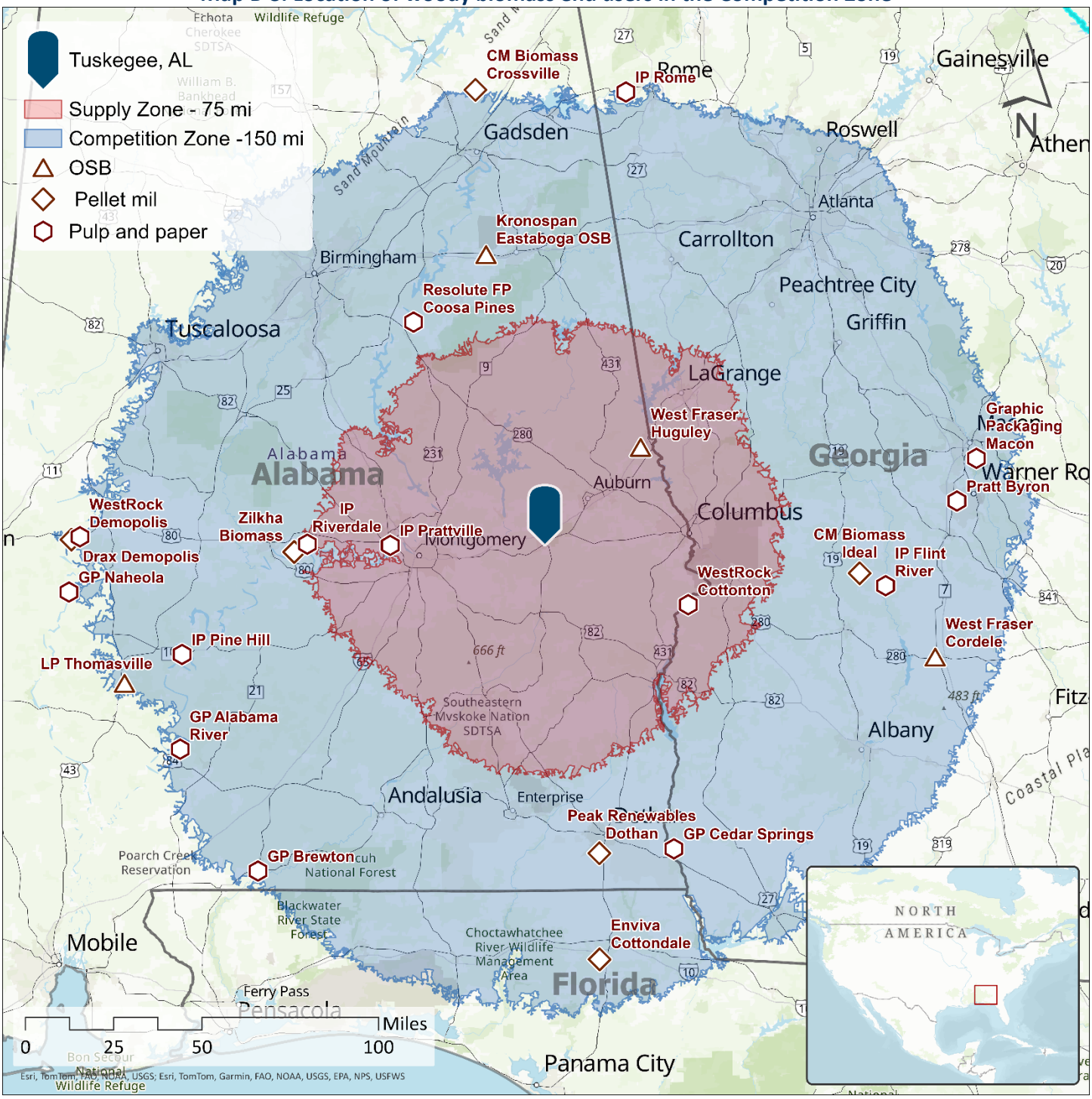


Table B-2 shows the estimated annual wood consumption of these facilities and their potential impact on the woody biomass supply in the Supply Zone. Their woody biomass demand from the Supply Zone is estimated based on the overlap of their wood supply area with the Supply Zone. We estimate the total annual wood consumption of the operating and announced facilities to be about 23.9 million bdt. From this total demand, about 15% is supplied from the Supply Zone.

Pulpwood is the main feedstock consumed by pulp and paper mills and OSB and EWP plants. As shown in Figure B-1, about 3.7 million bdt of pulpwood has been removed annually in the Supply Zone. In contrast, sawmill residues have been mainly used in the production of wood pellets and bioenergy.

Table B-2. Woody biomass consumption in the Competition Zone

Existing consumers of woody biomass	Estimated woody biomass demand (bdt/yr)	Estimated woody biomass demand procured from the Supply Zone (bdt/yr)
Pulp and paper mill	17,500,000	2,800,000
OSB mill	2,600,000	500,000
Wood pellet mill	1,800,000	45,000
Bioenergy plant	2,000,000	150,000
Total	**23,900,00**	**3,495,000**

We contacted all the eleven operating and under-construction sawmills in the Supply Zone and were able to discuss the availability of sawmill residues for future biomass projects with 10 of them. All the interviewed sawmills indicated that they have existing markets for their sawmill residues, including wood chips, wood shavings, sawdust, and bark. The majority of wood chips are sold to the pulp and paper mills in the Competition Zone. Two sawmills mentioned that they can make a small portion of their wood chips available (<10,000 bdt/yr). They also emphasized that more quantities of wood chips can be available if the new biomass projects are willing to pay higher prices than the current market prices. With the strong presence of several large pulp and paper mills, we expect a high risk for wood chips availability for future biomass projects and thus, this woody biomass is not included in the estimated rated quantity.

A portion of sawdust and wood shavings are used internally as a thermal energy source in the sawmills' kiln dryers, and the rest is sold to the wood pellet, animal bedding, landscaping, and bioenergy facilities. We did not find any wood shavings to be available for future biomass projects at low risk. The only sawmill residue streams that sawmills are interested in making available in larger quantities are sawdust and bark. Bark is mainly sold to the local mulch and landscaping companies. Given the seasonal nature of the much and landscaping market, some of the sawmills prefer to find a year-round market for their bark. Our outreach found about 55,000 bdt/yr of sawdust and bark are available for future biomass projects at low risk.

RATED QUANTITIES AND PRICING

Table B-3 summarizes the potential availability and the rated quantity for pulpwood, forest residues, and sawmill residues. The available quantity of pulpwood for harvesting (2.63 million bdt/yr) is based on the assumption that a similar net growth and removal trend will take place in the future. As shown in Figure B-1, the net growth and removal rates have not changed significantly from year to year. The growth-to-drain ratio has varied from 1.90 to 2.24, with an average value of 2. In addition, the timber harvesting, collection, and transportation operations are well-established in the Supply Zone, serving a large number of primary and secondary wood processing facilities (11 sawmills and 33 secondary end users). However, the large number of competitors, in particular, the well-established pulp and paper industry and the continuous growth of the forest industry in the Supply Zone, increase the risk of the availability of pulpwood for future biomass projects. Thus, we apply a BAM of 3 to capture the future competition from current competitors, variability in the pulpwood net growth and removal, and uncertainty associated with the information used in the analysis of supply, competition, and availability. This results in approximately 877,000 bdt of pulpwood available for harvest at low risk for future biomass projects.

As discussed before, the utilization of forest residues by the existing wood processing facilities is very limited due to the large production of pulpwood and sawmill residues in the Supply Zone. Thus, the forest residues supply chain has not been developed to support its commercial uses. There are uncertainties on whether the logging companies would be interested

in investing in logistics equipment to harvest, process, and transport forest residues without distracting them from their core business of harvesting and transporting sawlogs and pulpwood. We apply a large BAM of 4, meaning that approximately 133,000 bdt of forest residues would be available for utilization at low risk for future biomass projects.

Among the generated sawmill residue streams, only sawdust and bark would be available in large quantities for future biomass projects. We used a BAM of 1.2 to estimate their rated quantity, resulting in the low-risk availability of 46,000 bdt/yr of sawdust and bark. Sawdust and bark logistics are well-established, and the main competitor is the mulch and landscaping industry, which has seasonal demand, while a biomass project would create a year-round demand for this feedstock. Other sawmill residue streams, including wood chips and wood shavings, would be high-risk feedstocks for future biomass projects. Despite the fact that some of the sawmills mentioned they can make a portion of their wood chips available at a higher price than the current market prices, we expect that it will be very challenging for future biomass projects to secure commercial quantities of wood chips given the large number of pulp and paper and wood pellet facilities and their long presence and relationships with the local sawmills.

Table B-3. Rated quantities of pulpwood, forest residues, and sawdust and bark

Woody biomass type	Potential availability after the competition (bdt/yr)	BAM Factor	Rated Quantity (bdt/yr)
Pulpwood	2,630,000	3.0	877,000
Forest Residues	530,000	4.0	133,000
Sawdust and Bark	55,000	1.2	46,000
Total	**3,215,000**		**1,056,000**

Table B-4 shows the estimated rated pricing for pulpwood, forest residues, sawdust and bark. The rated prices were estimated based on the collected data from three sources, including direct outreach to the sawmills and local experts in the Supply Zone, Timber Mart South,[8] which provides average historical pricing for both pulpwood and sawmill residuals on a quarterly basis, as well as published documents.[9,10]

Table B-4. Rated pricing of pulpwood, forest residues, and sawdust and bark

Woody biomass type	Estimated rated pricing ($/bdt)- delivered to the center point	Price component
Pulpwood	60-90	Stumpage, silviculture, road construction and maintenance, harvesting, loading onto a log truck, transportation, broker fees, and profit margin
Forest Residue	60-80	Collection and piling at the landing site, road construction and maintenance, grinding, loading onto a chip van, transportation, and profit margin
Sawdust and Bark	60-70	Loading onto a chip van, transportation, and profit margin

Historical prices for pulpwood and sawmill residues reported by TimberMart-South show a relatively steady trend in the last ten years. In real terms, prices have been in a slight downward trend. Due to the supply and demand imbalance in the region for pulpwood (oversupply of pulpwood in the Supply Zone), this trend is expected to continue in the coming years.

[8] TimberMart-South (TMS) is a trusted source of current and long-term trend data for stumpage and delivered wood prices and other fundamental forestry business information for the Southeastern USA. TMS publishes quarterly and annual reports used by private companies, consultants, landowners, and others to assess market prices in 11 states in the US South.

[9] US Department of Energy, 2024. Biomass from Forested Land Base.

[10] Availability of Logging Residues and Likelihood of Their Utilization for Electricity Production in the US South, 2019.

Local experts highlighted that the pulp and paper mills in the region prefer to use pulpwood over wood chips for two reasons: (1) procuring and chipping pulpwood at their sites provides them with both wood chips and bark, which is used to generate steam and power and (2) a healthy inventory of pulpwood in the region has resulted in stable and low stumpage prices for pulpwood. The stumpage price for pine pulpwood and hardwood pulpwood was $8/bdt and $16/bdt for Macon County in Q3 2024.[11] This is about 10-20% of the pulpwood-rated prices. These prices are almost half of the average pulpwood stumpage prices in Alabama.[12] Since the removal of forest residues is not yet a common practice, there is not historical data available for this woody biomass type, and the reported pricing data in Table B-4 are based on the collected data from the outreach and the published literature.[13,14]

OPERATIONAL CONSIDERATIONS

The primary woody biomass available in the Supply Zone is pulpwood. We estimate 877,000 bdt/yr of pulpwood can be secured by future biomass projects with a low risk of supply. However, to harvest, collect, and transport this quantity of pulpwood, the existing logging and transportation capacity will need to be significantly expanded.

A typical harvesting crew in the US Southeast comprises 3-7 operators depending on the size of the harvest area and timber density, stand type (pine and hardwood), and the forest terrain. Each crew produces 8-12 truckloads per day.[15] Each truckload carries 12 to 14 bdt of roundwood. Assuming 6 days/week and 36 operating weeks for loggers to have access to the forest stands, about 30 logging crews (150 operators) would be required to harvest the pulpwood-rated quantity. Each truck can haul three loads of pulpwood per day.[16] Thus, 100 trucks and drivers will be needed to haul the rated quantity of pulpwood.

In our discussion with the Alabama Forest Commission, they stated that many loggers in Eastern Alabama are operating under capacity and usually do not have work to do on Fridays and sometimes Thursdays. They estimated that the loggers have unused capacity to harvest around 250,000 bdt/yr of timbers (30% of pulpwood rated quantity). Even with such available logging capacity, the existing logging and trucking capacity need to be significantly expanded to harvest and haul the pulpwood-rated quantity.

For the rated quantity of forest residues, we estimate that three grinders and 15 chip vans and truck drivers would be required.[17] With the large number of logging companies in the Supply Zone, we expect they will be able to expand their operations to harvest, collect, and haul forest residues if there is a long-term profitable market for forest residues.

[11] Macon County, Alabama Timber Prices
[12] TimberMart-South
[13] Pokharel, et al., 2019. Availability of logging residues and likelihood of their utilization for electricity production in the US South. *Journal of Forestry.* 117, 6.
[14] US Department of Energy, 2016. The 2016 Billion Ton Report: Advancing domestic resources for a thriving bioeconomy.
[15] Diniz, C., Smidt, M., Cooper, J., & Zhang, Y. (2023). Logging Crew Attributes by Region in the Southeast USA. *Croatian Journal of Forest Engineering: Journal for Theory and Application of Forestry Engineering*, *44*(2), 431-439.
[16] An average roundtrip distance of 100 miles, average speed of 40 miles/hr, 50 minutes of loading and unloading, and a 10 working hours per day
[17] An average grinder productivity of 20 bdt/hr, 6 days/week and 36 weeks of harvest season, and 4 chip vans per grinder

SECTION C: INFRASTRUCTURE

PROPERTY OVERVIEW

Address:	I-85 Exit 38
City:	Tuskegee, Alabama
County:	Macon
Acres:	277
Pricing Note:	$25K / Acre - Negotiable
Lease Available:	Yes
Topography:	Gently rolling hills
Zoning:	Industrial-Light, Industrial -heavy, Commercial

SITE CONTACT

Joe Turnham
Macon County Economic Development
608 Dibble Street, Suite 7
Tuskegee, AL 36083
334-444-2672
madeinmacon.com
joeturnham@aol.com

ADDITIONAL NON-RATED SITES

Infrastructure Sites Contact
Bob Buckingham
BDO Zone Infrastructure
bob@ecostrat.com

PROPERTY PROFILE

Macon County's CSX Select Site is an officially designated CSX Select site, one of three such sites in Alabama. The designation criteria include size, access to rail services, proximity to highways, workforce availability, natural gas, electricity, water and wastewater, environmental, and geotechnical standards. The site, situated at the exit 38 interchange of I-85, is just north of Moton Field. It is located in the center of a major southeast transportation corridor, with Atlanta to the east and Montgomery/I-65 to the west.

Transportation / Logistics

Nearest Highway: AL Highway 81
Nearest Interstate: I-85 (0.7 Miles)
Nearest Airport: Moton Field
Nearest Commercial Airport: Montgomery Regional (50 miles)
Distance to Port: 40 miles

Rail Served: Yes, CSX
Rail Accessible: Yes
Rail Infrastructure in Place: Yes
Rail Contact (229) 630-9564
Rail Email: Rashard-howard@csx.com

Electric Service

Supplier: Dixie Electric
Ownership: Cooperative
Phone: 888-349-4332

Website: https://www.dixie.coop/
All Utilities Extend to Site: Yes
Nearest Substation: <1 mile

Capability: 115kV, 46 kV, and 13.2 kV 3-Phase overhead available at the site. 3000 AMP service available

Natural Gas

Supplier: Southern Company Gas
Ownership: Investor Owned
Phone: (404) 584-4000

Website: southerncompanygas.com/
Size of Proposed Main: 6"
Pressure: 50 psi

Water

Supplier: Utilities Board of Tuskegee
Ownership: Public
Phone: (334) 720-0700

Website https://www.yourubt.com/
Size of Main: 6"
Peak Capacity: 4,000,000 gals/day

Capability: New raw water pumping facility, doubled capacity

Wastewater

Supplier Utilities Board of Tuskegee
Ownership: Municipal
Phone: 620-421-1228

Website: https://www.yourubt.com/
Size of Main: 24"
Capability: 1,000,000 gals/day

Telecommunications

Supplier: Point Broadband
Ownership: Private
Phone: (678) 463-7687

Website: www.point-broadband.com/
Platforms: Fiber, wireless

Capability: Primary wireless and fiber optics available.

SECTION D: RISK INDICATOR SCORING METRICS

CATEGORY 1.0: SUPPLIER RISK

1.1 Risk Factor: Credit-Worthiness/Future Solvency of Suppliers

1.1.1 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.

Risk Information: Most of the sawmills in the Supply Zone are owned by established forest companies and have been in operations for more than two decades. As shown in Figure B-4 and confirmed by the local experts, the Supply Zone has experienced an increase in the sawmilling production capacity in the last decade. There are several drivers behind the growing forest industry in the region. The Supply Zone has an abundance of sustainable and affordable timber supply. The state of Alabama has a supporting tax regime for the manufacturing industry. Alabama's corporate tax environment ranks well above the national midpoint (Rank 12 in 2024).[18] Other supports, such as training and recruiting logging, trucking, and milling workforce by the ForestryWork organization, have also contributed to the growth of the forest industry. In 2024, 10 sawmills were operating with a production capacity of 1,238 MMBF. This capacity is projected to reach 1,438 MMBF (16% increase in the sawmilling capacity) in 2025.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

1.2 Risk Factor: Conflicts of Interest/Vested Interest with Competing Market(s)

1.2.1 Suppliers' Dependence on, or Preference for, Competing Markets

Rationale: Suppliers may have a vested interest or preference in supplying specific competitors with 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' dependence on competing markets to accept or purchase other products/by-products. During periods of feedstock shortage, such suppliers may be more likely to allocate the scarce supply to competitors, resulting in supply disruptions for the Issuer.

Risk Information: Our outreach indicated that most sawmills have a vested interest in supplying their wood chips to the pulp and paper mills, which are owned by well-established forest companies that have been in the business for decades.

[18] Tax Foundation, 2025 State Tax Competitiveness Index

On the other hand, sawmills always prefer to have multiple markets for their sawdust and bark as some of the existing consumers have seasonal demands, such as landscaping and mulch companies. Other consumers, such as wood pellet plants, are relatively new players that depend on the government's climate change policies. Thus, some of the sawmills are open to make a portion of their sawdust and bark available for new markets. These factors were considered in the calculation of rated quantity for sawmill residues.

There is a significant surplus of pulpwood in the Supply Zone, and private landowners sell their timbers to consumers who are willing to pay more. So, there is no market preference for pulpwood. However, the current consumers of pulpwood (i.e., pulp and paper mills, OSB plants, and EWP mills) usually have higher affordability to pay for pulpwood in case the demand from these facilities increases.

There is no established market for forest residues, and they are usually left behind in the forest. A proper market price is required for forest residues to encourage logging companies to invest in grinding and transportation equipment.

Overall, with a large number of existing consumers of woody biomass in the Competition Zone, this risk could be high for biomass projects that need large quantities of woody biomass annually.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed high, therefore the RRL is 8 out of 10.	**8**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed high, therefore the RRI is 8 out of 10.	**8**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 64 out of 100.	**64**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* The establishment of a biomass project by one of the existing consumers or a joint venture with them will mitigate the impact of this risk. This is a probable scenario due to the existence of integrated forest companies that own sawmills and pulp and paper mills or sawmills and pellet mills. Thus, it is notched by 50%. The Total Notch (RRL Notch) X (RRI Notch) is 50%.	**Notch** **50%**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 32 out of 100.	**32**

1.3 Risk Factor: Supplier Control Over Production and Transportation

1.3.1 Ownership of Land/Means of Production

Rationale: Suppliers that own land or a production facility where feedstock is produced tend to have better control of supply chains and present lower degrees of supply risk.

Risk Information: Approximately 94% of the timberlands within the Supply Zone are owned by the private sector. Approximately 4% are held by the federal government and 2% by state and local governments. Private landowners, which include both forest industry and nonindustrial private entities, have always owned the majority of Alabama's forests, including the Supply Zone. This ownership pattern is highly favorable with respect to accessing open-market timber and biomass for industrial purposes.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed very low, therefore the RRL is 2 out of 10.	**2**

Raw Risk Impact (RRI) The risk impact is deemed very low, therefore the RRI is 2 out of 10.	**Score** **2**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 4 out of 100.	**Score** **4**

1.3.2 Ownership of Equipment

Rationale: In most cases, suppliers that own or lease equipment for harvest, collection, and processing feedstock are at lower risk than those that are 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 convenient harvest times, and quantity shortages can result. However, in some circumstances, reliance on third-party equipment to harvest or produce feedstock can decrease supply chain risk. For example, when harvesting agricultural residues such as corn stover, using a third-party company with standard equipment specializing in harvesting, collection, and transportation may decrease quality variations (e.g., ash content) of the final feedstock.

Risk Information: In the Supply Zone, the logging companies own harvest and collection equipment such as feller-bunchers, skids, and loaders. This reduces the risk of delayed harvesting and delivery. They also expressed interest in investing in forest residue harvesting and collection equipment if there is a solid, long-term, profitable market for this material. This is a very low risk in the Supply Zone.

Raw Risk Likelihood (RRL) The risk likelihood is deemed very low, therefore the RRL is 2 out of 10.	**Score** **2**
Raw Risk Impact (RRI) The risk impact is deemed very low, therefore the RRI is 2 out of 10.	**Score** **2**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 4 out of 100.	**Score** **4**

1.3.3 Ownership of Transportation/Logistics

Rationale: In most cases, suppliers that own or lease transportation equipment necessary to transport biomass from forests or fields are at lower risk than those that do not. However, in some circumstances, reliance on third parties to transport biomass is common practice and does not contribute to risk.

Risk Information: In addition to the logging equipment, the majority of logging companies own trucks and trailers. About 90% of logging trucks are owned by the loggers as they need to get the harvested timbers out of the forest stands in a timely manner. The remaining portion of transportation capacity is offered by large trucking companies such as JB Hunt.

For wood chips, some of the sawmills that have long-term contracts with the local pulp and paper mills own trucks for the regular delivery of wood chips to these mills. For sawdust and bark, sawmills have contracts with local logistics companies that specialize in bulk transportation.

Overall, the current ownership of logistics equipment is a very low risk for future biomass projects.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed very low, therefore the RRL is 2 out of 10.	**2**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed very low, therefore the RRI is 2 out of 10.	**2**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 4 out of 100.	**4**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 4 out of 100.	**4**

1.3.4 Feedstock as a Secondary Transformation

Rationale: Secondary transformation is dependent upon the production of primary products. Forest residues, corn stover, bark, and sawmill chips (unless from a dedicated chip mill) are all secondary transformations of a primary product.

Risks are higher if the feedstock is a secondary transformation of a primary, more valuable product. In the absence of markets for the primary product, it may not be economical for suppliers to produce biomass on their own. For example, a supplier may produce dimensional lumber as its primary product and wood chips as a by-product, therefore relying on the health of the housing market for production levels. If the demand for dimensional lumber drops, so can the availability of sawmill residues.

In the case of agricultural feedstocks, such as corn stover, the feedstock is a by-product of a primary crop. Since the primary crop is significantly more lucrative than the residue, it will be a priority for the producer. If the production of the primary crop requires resources to be taken away from the production of the secondary crop (e.g., shorter harvesting windows due to weather), the secondary feedstock supply will suffer. In times of stretched resources,

suppliers may also perceive the harvest and collection of the feedstock as a nuisance, potentially decreasing production levels.

Understanding the economic drivers for suppliers' primary products can help gauge risk levels for secondary transformation biomass products.

Risk Information: The primary source of feedstock in the Supply Zone is pulpwood (90%), which is not a byproduct of the forest industry. Logging companies harvest pulpwood based on the demand for this feedstock regardless of the demand situation for sawtimber.

In contrast, the production of forest and sawmill residues depends on the demand for high-value forest products such as lumber and plywood. The historical data shows that due to the abundance of affordable timbers and the favorable tax regime in Alabama, the sawmill industry has been very stable despite the volatility in the lumber market. This risk is deemed to be low for the Supply Zone.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

1.4 Risk Factor: Supplier Experience

1.4.1 Fundamental Feedstock Production Experience

Rationale: Risk is higher when suppliers have limited experience with planting, growing, harvesting, processing, and/or collecting biomass. Limited experience may be common for stover or forest residue supply chains where farmers or forestry producers may have no previous experience.

Risk Information: The Supply Zone has a rich pool of skilled workforce who are supporting the existing forest industry. According to Macon County Economic Development Authority, there are currently 71 logging companies (280% more than the US average) with 330 logging equipment operators (333% more than the US average) in the Supply Zone.[19] According to FIA data, on average, about 7 million bdt of sawtimber and pulpwood have been harvested annually in the Supply Zone in the last 10 years.

The sawmill industry has been growing with a nearly 2.5 times increase in the sawmilling capacity in the last 10 years, an indication of the competitiveness of the forest industry in the region and an established knowledge of feedstock production and logistics.

Raw Risk Likelihood (RRL)	**Score**

[19] Macon County Economic Authority, 2024. Forest Products.

The risk likelihood is deemed very low, therefore the RRL is 2 out of 10.	**2**
Raw Risk Impact (RRI) The risk impact is deemed very low, therefore the RRI is 2 out of 10.	**Score** **2**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 4 out of 100.	**Score** **4**

1.4.2 Production Scale Experience

Rationale: Scale-up entails risk. Risk is higher when suppliers have limited experience producing the required quantity of feedstock.

Risk Information: As explained in the previous risk indicator, the forest industry in the Supply Zone including both the logging and sawmilling companies have been processing sawtimbers and pulpwood in commercial quantities for decades. They have a well-established experience of production scale-up.

Raw Risk Likelihood (RRL) The risk likelihood is deemed very low, therefore the RRL is 2 out of 10.	**Score** **2**
Raw Risk Impact (RRI) The risk impact is deemed very low, therefore the RRI is 2 out of 10.	**Score** **2**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 4 out of 100.	**Score** **4**

1.5 Risk Factor: Supplier Harvesting/Collection/Processing Capacity

1.5.1 Supplier's Equipment Efficiency

Rationale: Equipment efficiency significantly influences the supplier's feedstock production capacity. Understanding the supplier's equipment capability enables understanding of their ability to produce feedstock of suitable quality.

Risk Information: A large number of sawmills are owned and operated by well-established forest companies that are capable of meeting the woody biomass demand of various end users. In addition, constant government support to train and recruit logging, trucking, and milling workforce has resulted in efficient harvesting, collection, and transportation operations in the Supply Zone.

Raw Risk Likelihood (RRL) The risk likelihood is deemed very low, therefore the RRL is 2 out of 10.	**Score** **2**
Raw Risk Impact (RRI) The risk impact is deemed very low, therefore the RRI is 2 out of 10.	**Score** **2**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 4 out of 100.	**Score** **4**

1.6 Risk Factor: Supplier Motivation

1.6.1 Feedstock Production Priority

Rationale: When biomass feedstock is a secondary or non-core line of business, a by-product, or a residual from a more valuable product, suppliers may not put in sufficient effort for consistent production. The risk of breach increases when feedstock production and/or delivery compromise a supplier's ability to make a primary product.
When biomass feedstock is a by-product of another main higher margin or main product such as corn stover (e.g., corn) or forest residues (e.g., pulpwood), supply may not be a top priority for a supplier.

Risk Information: Pulpwood is the primary feedstock used by pulp and paper, OSB, EWP, and wood pellet plants. Logging companies harvest pulpwood based on the demand from these industries, regardless of the demand for sawtimbers.

Sawmill residues are the byproduct of lumber manufacturing; however, finding markets for sawmill residues is a priority for sawmills. They cannot continue to operate if they are not able to sell their residues. Unsold sawmill residues become a liability for sawmills as they end up with a large pile of sawmill residues on their sites.

Forest residues are also a by-product, and it is not a priority for logging companies to process them unless there is a market for this material. However, they are not the main source of feedstock in the Supply Zone. Overall, this risk is deemed to be low.

Raw Risk Likelihood (RRL) The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**Score** **4**
Raw Risk Impact (RRI) The risk impact is deemed low, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)*	**Notch** **NN**

No adjustment.

The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).

Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

CATEGORY 2.0: COMPETITOR RISK

2.1 Risk Factor: Influence on Feedstock Supply of Existing Markets

2.1.1 Competitors' Locations and Overall Geographical Influence

Rationale: Competitors' locations relative to siting locations within a BDO Zone can affect the viability of procuring feedstock and the cost of that feedstock. Accurate and detailed competitor mapping provides an understanding of a competitor's geographical influence on new plants within a BDO Zone, including competitive advantages such as short hauling.

Risk Information: There are 33 operating facilities using woody biomass as feedstock. Two new plants are also planned to be built in the Competition Zone. We estimate the total annual wood consumption of the operating and announced facilities to be about 23.9 million bdt. Out of which, five facilities are located in the Supply Zone, consuming about 3.5 million bdt of woody biomass annually. Most of these facilities are owned by established forest companies that have long-term relationships with the sawmills in the Supply Zone.

Although we considered their demands in the calculation of the rated quantities, they can affect the pulpwood and sawmill residues availability and pricing. Their impact depends on the annual biomass demand and the location of the future biomass projects in the Supply Zone.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed high, therefore the RRL is 8 out of 10.	**8**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed medium, therefore the RRI is 6 out of 10.	**6**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 48 out of 100.	**48**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* The establishment of a biomass project by one of the existing consumers or a joint venture with them will mitigate the impact of this risk. This is a probable scenario due to the existence of integrated forest companies that own sawmills and pulp and paper mills or sawmills and pellet mills. Thus, it is notched by 50%. The Total Notch (RRL Notch) X (RRI Notch) is 25%.	**25%**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 36 out of 100.	**36**

2.1.2 Current and Historical Consumption of Feedstock Quantity

Rationale: Clear understanding of feedstock consumption by key competitors for each rated feedstock type in the BDO Zone is essential to quantifying competitor risk.

Understanding current consumption and historical trends of feedstock utilization can provide valuable information about feedstock price elasticity during shortages and insight into events that may impact future supply conditions. It can enable more accurate estimates of the sensitivity of feedstock availability to potential future consumption levels or the impact of external events (e.g., weather events, structural economic changes, seasonality, or policy change).

Risk Information: As discussed in the previous risk indicator, there are many existing competitors that have been in operation for many years. The availability of commercial quantities of sustainable and affordable sawtimber and pulpwood has allowed these competitors to co-exist without putting pressure on the wood supply and prices.

Historical prices for pulpwood and sawmill residues reported by TimberMart-South show a relatively steady trend over the last ten years. In real terms, prices have been in a slight downward trend. Due to the supply and demand imbalance in the region for pulpwood (oversupply of pulpwood in the Supply Zone), these trends are expected to continue in the coming years.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed medium, therefore the RRL is 6 out of 10.	**6**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed medium, therefore the RRI is 6 out of 10.	**6**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 36 out of 100.	**36**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 36 out of 100.	**36**

2.1.3 Competitor Pricing and Price Sensitivity

Rationale: Understanding how much competitors pay (or receive) for different feedstock types is essential in determining the Issuer's competitiveness and accurately assessing the delivered cost range in the BDO Zone rating.

Current and historical prices paid/received by competitors provide insight into their procurement behaviors and exert pressure on suppliers in the BDO Zone, such as the ability/willingness to pay premiums for feedstock during times of feedstock shortage or reduce prices (or cut-off deliveries) during gluts. Competitors that have the ability to offer higher prices for feedstock during feedstock shortages can pose a significant risk to the Issuer.

Knowledge of competitor pricing and price sensitivity is also an essential prerequisite to formulating a feedstock cost curve, which can enable predictions of feedstock redundancy, i.e., how much feedstock could become available at different pricing levels (see Category 3–Supply Chain Risk 3.1.3).

Risk Information: As explained in the previous risk indicator, due to the oversupply of sawtimber and pulpwood in the Supply Zone, pulpwood and sawmill residues prices have been on a slight downward trend, and these trends are expected to continue in the coming years. Among the existing competitors, the pulp and paper mills, OSB, and EWP facilities have higher feedstock paying capabilities compared to biomass proponents. If the annual biomass demand of

future biomass projects impacts the supply of pulpwood for these competitors, it can result in higher prices for biomass projects.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed high, therefore the RRI is 8 out of 10.	**8**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 32 out of 100.	**32**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 32 out of 100.	**32**

2.1.4 Impacts of Future Demand on Feedstock Availability and Price by Current Competitors

Rationale: Feedstock utilization in a BDO Zone can change over time. Expansion of feedstock demand by current competitors can put additional pressure on feedstock and lead to higher prices, feedstock disruptions, shortages, supplier breaches, or other types of supply chain disruption.

If current markets for feedstock have been publicly signaling the potential for increased demand for feedstock (in the case of a sawmill adding a shift or pulp mill potentially expanding into the production of renewable chemicals, for example), high interest in a supply zone can make suppliers overconfident, leading to a supplier-controlled market where short-term contracting becomes the norm and supply chain reliability is compromised for the Issuer. If and when it occurs, increased demand on feedstock may decrease availability and increase cost for new plants within the BDO Zone.

Risk Information: Both the primary and secondary forest industries have been expanding due to a sustainable supply of sawtimbers and pulpwood in the Supply Zone. Three sawmills with a combined capacity of 535 MMBF have been built in the last 10 years, and a new one is planned to be established in 2025 with a capacity of 200 MMBF. The expansion of the sawmill industry has resulted in the development of the wood pellet industry. Four pellet mills have been constructed since 2013. One OSB and one EWP plant have also been built.

Despite all these expansions, the availability of sawmill residues from recently built sawmills and the oversupply of pulpwood has not resulted in an increase in the price of woody biomass feedstocks. Our feedstock assessment shows there are still commercial quantities of pulpwood, forest residues, and sawdust and bark available at low risk, and the future demand of the current competitors is deemed to be a medium risk.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed medium, therefore the RRL is 6 out of 10.	**6**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed medium, therefore the RRI is 6 out of 10.	**6**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 36 out of 100.	**36**

Mitigation/Notching	Notch
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 36 out of 100.	**36**

2.1.5 Soft Supply Influence of Existing Markets

Rationale: In some cases, existing markets for feedstock may be able to exert high degrees of pressure over local suppliers, effectively enabling control of feedstock, especially during times of shortage. This control can derive from qualitative or "soft" factors, such as long previous relationships between local suppliers and existing markets for feedstock.

Risk Information: In our feedstock supply and demand analysis, we did not find any evidence of soft supply influence of existing markets due to a healthy production of feedstock in the Supply Zone.

Raw Risk Likelihood (RRL)	Score
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

2.1.6 Temporary Market-Driven Markets

Rationale: Alternative, non-traditional, market-driven competitors for feedstock can drive feedstock demand in unusual circumstances. A BDO Zone Rating Issuer based on corn stover as a feedstock, for example, would not typically compete with higher-end animal feed markets due to quality issues. However, in times of significant hay shortage (e.g., during drought), farmers use corn stover in place of hay, driving the price of feedstock and decreasing availability for bio-projects.[20]

Risk Information: In our outreach, we did not find any alternative, non-traditional, market-driven competitors for feedstock. All existing competitors are established traditional users of woody biomass.

Raw Risk Likelihood (RRL)	Score
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**

[20] Bergtold, 2018.

Raw Risk Impact (RRI) The risk impact is deemed low, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**Score** **16**

2.2 Risk Factor: Specific Competitors' Competitive Advantage

2.2.1 Relative Inventory Capacity

Rationale: The more inventory a competing biomass facility is able to store, the more competitive pressure it can exert on supply. Ability to store large inventories allows competitors to purchase inventory when the prices are low, potentially giving it an economic advantage. Additionally, the ability to store inventory during feedstock supply surpluses can enable competitors to continue to intake feedstock when the Issuer's plant (with lesser inventory capacity) may be forced to put suppliers on quota. Larger inventory capacity on the part of competing markets creates supplier loyalty and can make it more difficult for new projects to secure supply without paying a significant premium.

Risk Information: The large consumers of woody biomass, such as pulp and paper mills and OSB plants, are able to store large quantities of pulpwood in their yards. However, with the established woody biomass logistics systems and an oversupply of feedstock such as pulpwood in the Supply Zone, they only hold enough inventory to cope with temporary shortages, such as limited access to the forest during months that typically see higher rainfall amounts. This could be a medium risk for future biomass projects if they need large quantities of feedstock.

Raw Risk Likelihood (RRL) The risk likelihood is deemed medium, therefore the RRL is 6 out of 10.	**Score** **6**
Raw Risk Impact (RRI) The risk impact is deemed medium, therefore the RRI is 6 out of 10.	**Score** **6**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 36 out of 100.	**Score** **36**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 36 out of 100.	**Score** **36**

2.2.2 Relative Accessibility/Delivery Hours and Wait Times

Rationale: The value attributed by suppliers to local competing markets for biomass is often directly related to the degree of flexibility the market provides in terms of delivery hours, and the more efficient discharge can occur.

Risk Information: Woody biomass logistics are well-established in the Supply Zone to meet the delivery needs of various end users such as log delivery, walking floor trucks, and truck dumping ramp. We believe future biomass projects will leverage the existing logistics equipment and the common practices for accessibility to their sites to receive woody biomass in commercial qualities. This risk is deemed to be low.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

2.2.3 Relative Specification Advantages

Rationale: When choosing a market for biomass feedstock, suppliers not only look at price, but also at relative quality requirements or specifications. It is important to understand feedstock quality specifications for competing markets within the BDO Zone, in order to accurately quantify the risk that competitors can exert on the Issuer's supply chain.

Risk Information: The pulp and paper and OSB plants are receiving pulpwood from the logging companies in the form of roundwood. The wood pellet, bioenergy, and landscaping companies are receiving sawmill residues from sawmills with no pre-processing. The future biomass projects will likely receive their feedstock similar to the existing competitors and perform pre-processing and pre-treatment operations at their facilities.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**

The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	16

2.2.4 Demand for Competitors' Products

Rationale: Increased demand for the competitor's final product can cause an increased demand for feedstock by the competitor. For example, an increased demand for wood pellets due to high energy prices in Europe or for biofuels due to a favorable clean fuels policy can cause increased pellet/biofuel production by competing markets. Thereby driving demand for feedstock within a BDO Zone.

Risk Information: The majority of products being produced from woody biomass in the Competition Zone are global commodities (i.e., pulp, paper, packaging box, OSB, and wood pellets). Competitors need to compete with other global players in terms of prices in order to thrive and grow. The healthy supply of affordable saw timbers and pulpwood and a supporting tax regime in the state of Alabama for the manufacturing industry have enabled the existing competitors to continue expanding in the Supply Zone despite the volatility in the regional and global markets. As discussed in Risk Indicator 2.1.4, our feedstock assessment shows there are still commercial quantities of pulpwood, forest residues, and sawdust and bark available at low risk, and the future demand of the current competitors is deemed to be a medium risk.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed medium, therefore the RRL is 6 out of 10.	**6**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed medium, therefore the RRI is 6 out of 10.	**6**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 36 out of 100.	**36**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 36 out of 100.	**36**

CATEGORY 3.0: SUPPLY CHAIN RISK

3.1 Risk Factor: Feedstock Availability

3.1.1 Biomass Availability Multiple (BAM)

Rationale: Biomass Availability Multiple (BAM) indicates the degree of redundancy in an Issuer's supply chain in relation to the rated quantity in the BDO Zone. BAM is the mean ratio of biomass feedstock available to a project in relation to delivered cost, divided by the Issuer's mean rated quantity. BAM is a strong indicator of supply chain resilience when stressed by supply shortage and/or supplier breach. BAMs of 1.5 or higher are generally signals of lower feedstock risk for new projects in BDO Zones.

Risk Information: We considered a small BAM of 1.2 for sawdust and bark due to the established logistics and the feedback from the outreach and a high BAM of 3 for pulpwood due to the large number of existing competitors and 4 for forest residues. There is no established demand for forest residues due to the availability of pulpwood and sawmill residues at affordable prices. In addition, logging companies and future biomass projects need to invest in grinding equipment and chip vans to collect and transport forest residues. Overall, we have considered the major uncertainties in the BAM values used to estimate the rated quantities.

Raw Risk Likelihood (RRL) The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**Score** **4**
Raw Risk Impact (RRI) The risk impact is deemed low, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**Score** **16**

3.1.2 Feedstock Supply Curve/Marginal Cost Curve

Rationale: The greater the feasible transport distance, the more feedstock is accessible to the Issuer, but at a higher delivered cost. The feedstock supply curve, sometimes referred to as the marginal cost curve, is a function of feedstock availability over its cost, which is primarily, but not exclusively, a function of distance. The feedstock supply curve is used to determine the availability of redundant feedstock at various price points, and the cost of replacing feedstock with substitutes located at different distances.

Feedstock cost curves are useful in determining supply chain resilience; they provide information about the cost of feedstock availability in times of supply disturbance. Biomass supply chains are prone to supply disturbances over time; suppliers can become insolvent, or weather events can temporarily disrupt feedstock availability. When a disturbance occurs, the Issuer may need to source replacement feedstock from different suppliers at different locations and costs. A biomass supply curve indicates quantities of feedstock available at various price levels from suppliers generally located further away than the core supplier.

Risk Information: As shown in Figure B-3, pulpwood and forest residues availability in the Supply Zone increases gradually in 5-mile driving distance intervals. Cost increases resulting from a supply radius expansion are therefore expected to be gradual. The haul rate is $0.4/bdt/loaded mile for the first 36 miles, with the incremental haul rate of $0.36/bdt/loaded mile for additional haul distances.[21] Each 5-mile driving distance adds about $2/bdt to the delivered price.

As shown in Figure B-5, there is no production of sawmill residues in the first 30-mile driving distance. About 43% of sawmill residues are generated in the driving distance of 50 miles, and the rest is available in the driving distance of 50-75 miles from the center point (Tuskegee), where most of the sawmills are located.

Overall, we expect the marginal cost of feedstocks to be low due to the fairly even distribution of available woody biomass in the Supply Zone.

Raw Risk Likelihood (RRL) The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**Score** **4**
Raw Risk Impact (RRI)	**Score**

[21] TimberMart-South, Q3 2024

The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**Score** **16**

3.1.3 Seasonal Feedstock Supply Variation

Rationale: Biomass supply can present significant seasonal supply variations. Seasonal supply variations combined with limitations associated with longer-distance transportation and storage can lead to BDO Zone biomass supply imbalances[22] and can manifest in shortages and higher costs for Issuers.

Risk Information: Timber harvesting takes place throughout the year, with the winter and spring seasons tending to be wetter. Wet weather makes it difficult for loggers to harvest and transport as many logs per day as they can during dry times. The summer and fall seasons are opportune times for mills to stockpile inventory in preparation for the ensuing winter and spring months. This well-coordinated approach helps to mitigate the challenges posed by seasonal weather patterns and ensures a steady supply of timber to the mills. This is a well-established practice in the forest industry in the Supply Zone.

Raw Risk Likelihood (RRL) The risk likelihood is deemed medium, therefore the RRL is 6 out of 10.	**Score** **6**
Raw Risk Impact (RRI) The risk impact is deemed medium, therefore the RRI is 6 out of 10.	**Score** **6**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 36 out of 100.	**Score** **36**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 36 out of 100.	**Score** **36**

3.1.4 Year-to-Year Variation in Feedstock Availability

Rationale: Biomass can have significant year-to-year supply variations due to variability in yield from biomass harvesting operations, particularly with agricultural biomass.

[22] Golecha & Gan, 2016.

Risk Information: None of the available feedstocks have experienced significant year-to-year variability due to the thriving forests and the forest industry and reliable logistics operations. The annual pulpwood net growth and forest residues production have been fairly constant (see Figure B-1 and Figure B-2). In addition, the growth of the sawmilling capacity in the Supply Zone has resulted in a steady production of sawmill residues.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**

Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**

Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**

Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**

Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

3.2 Risk Factor: Historical Issues

3.2.1 Historical Feedstock Price Variations

Rationale: If the historical feedstock price shows volatility, then the risk of future price fluctuation is elevated. If feedstock prices have historically exceeded the price at which the Issuer would have to cease operations or breach a financial covenant (i.e., the "red line" feedstock cost), then mitigation measures should be put in place.
Risk Information: Historical prices for pulpwood and sawmill residues reported by TimberMart-South show a relatively steady trend in the last ten years. In real terms, prices have been in a slight downward trend. Due to the supply and demand imbalance in the region for pulpwood (oversupply of pulpwood in the Supply Zone), these trends are expected to continue in the coming years.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**

Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**

Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**

Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**

Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

3.2.2 Low Historical Demand for Feedstock in the BDO Zone

Rationale: If Issuer BDO Zone does not have a history of developed large-scale feedstock procurement, suppliers may not have sufficient expertise in feedstock production to ensure reliable supply, especially in the early years. This can be particularly true for forest residues, where typically, the infrastructure for collection, processing, and delivery is immature.

Where supply chains are not well-established, risk can be mitigated when new bio-based plants control a higher degree of feedstock processing. For example, if a BDO Zone rating is issued for clean wood chips and the historical demand in the Zone has been exclusively for pulpwood, then supply chain risk will be decreased for new bio-based plants that intake pulpwood and manage log debarking and chipping internally. Rather than requiring inexperienced suppliers to deliver debarked wood chips.

Risk Information: Both the primary and secondary forest industries and their supply chains are well-established due to the availability of sustainable sawtimber and pulpwood inventories in the Supply Zone. While forest residues have not been harvested in large quantities, the equipment used for their harvest, collection, and transportation are available and are common to forestry operations in the Southeast USA.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

3.2.3 History of Production/Feedstock is a New/Secondary Crop or By-Product

Rationale: If 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. Secondary crop or by-product producers may be less likely to prioritize production.

For new crop types, inexperience in planting, harvest, collection, and yield data may pose higher levels of risk.

If feedstock is a secondary transformation (i.e., wheat straw, corn stover, or forest residue), then production can be subject to variables beyond suppliers' control (e.g., changing demand for sawtimber, or primary crop prices).

Risk Information: The region has a long history of forestry and use of forest products. The establishment of sawmills traces its roots to the 19th century, a period marked by the rapid expansion of the lumber industry in the region. So, the industry has an established knowledge of pulpwood harvesting, handling and transportation, and the production and use of sawmill residues. In contrast, harvesting forest residues, while feasible, is carried out rarely.

Raw Risk Likelihood (RRL)	**Score**

The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI) The risk impact is deemed low, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**Score** **16**

3.3 Risk Factor: Non-Weather Based Externalities

3.3.1 Consumer Price Index (CPI) and Producer Price Index (PPI)

Rationale: CPI and PPI can impact feedstock cost of harvest and collection over time. Sensitivities to worst-case scenarios should be run.

Risk Information: General economic trends can significantly influence the delivered feedstock prices, as was observed during the COVID-19 pandemic, resulting in global supply chain interruptions and rising inflation.

Key economic indicators, such as the Producer Price Index (PPI) or Consumer Price Index (CPI), are effective tools for monitoring price trends that impact biomass logistics, operations, and associated costs, including fuel, labor, equipment parts, and administration.

Figure E-4 illustrates the change in the CPI over the past five years for the US South Region, indicating a notable increase in inflation from November 2020 to June 2022. Subsequently, the rate of inflation has generally declined until now. A comparison between diesel prices (Figure E-5) and the CPI trend from 2020 to 2023 confirms that fuel costs parallel economic trends in the BDO Zone.

However, this was not unique to the BDO Zone, and other forest regions in the country experienced the same trend. Due to the sensitivity of biomass logistics to the transportation cost, continuous changes in CPI and inflation always impact the feedstock prices. The feedstock producers and users usually consider rising inflation in their business models and supply contracts. This risk indicator is deemed medium for biomass feedstock projects.

Raw Risk Likelihood (RRL) The risk likelihood is deemed medium, therefore the RRL is 6 out of 10.	**Score** **6**
Raw Risk Impact (RRI) The risk impact is deemed medium, therefore the RRI is 6 out of 10.	**Score** **6**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 36 out of 100.	**Score** **36**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment.	**Notch** **NN**

The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 36 out of 100.	**36**

3.3.2 Currency Risk

Rationale: Where feedstock is purchased in a currency different than that which a new bio-based plant will locate in a BDO Zone, currency exchange rates and volatility can constitute risk exposure. BDO Zones that cross the US-Canada border, for example, which intake feedstock from both countries, are exposed to such currency risk.

Risk Information: This risk is irrelevant for this Supply Zone as feedstock is expected to be supplied for future biomass projects within the Supply Zone.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed not relevant, therefore the RRL is not rated (NR).	**NR**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed not relevant, therefore the RRI is not rated (NR).	**NR**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is not rated.	**NR**
Mitigation/Notching	**Notch**
The Total Notch (RRL Notch) X (RRI Notch) is NR (Not Rated).	**NR**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is not rated.	**NR**

3.3.3 Border Risk

Rationale: Where feedstock is transported cross-border to another country, risk exposure to border closures and crossing delays becomes present. The availability of trucks willing to do cross-border runs is limited, which can decrease supply chain flexibility and resilience. Plants near the US-Canada border, which intake feedstock from both countries, are exposed to these risks.

Risk Information: This risk is irrelevant for this Supply Zone as feedstock is expected to be supplied for future biomass projects within the Supply Zone.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed not relevant, therefore the RRL is not rated (NR).	**NR**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed not relevant, therefore the RRI is not rated (NR).	**NR**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is not rated.	**NR**
Mitigation/Notching	**Notch**
The Total Notch (RRL Notch) X (RRI Notch) is NR (Not Rated).	**NR**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is not rated.	**NR**

3.3.4 Temporary Externality-Driven Markets for Feedstock

Rationale: Alternative, non-traditional, externality-driven competitors for feedstock can drive feedstock demand (and cost) in unusual circumstances. For example, an Issuer using corn stover as a feedstock would not typically compete with the higher-end animal feed market. However, in times of significant hay shortage (e.g., during drought), farmers

may use corn stover as hay replacement, driving the price of stover feedstock and decreasing its availability for bio-projects.[23]

Risk Information: The feedstock supply chain and the wood product manufacturing industry are firmly established in the Supply Zone. The probability of temporary external factors causing significant disruptions in the forestry industry is low. Furthermore, there is no historical record of alternative, non-traditional competitors emerging in the region due to externalities. The established nature of the feedstock supply chains and processes and the absence of such competitors contribute to the stability and reliability of feedstock availability in the Supply Zone.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed very low, therefore the RRL is 2 out of 10.	**2**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed very low, therefore the RRI is 2 out of 10.	**2**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 4 out of 100.	**4**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 4 out of 100.	**4**

3.4 Risk Factor: Risks Related to Feedstock Production, Harvest, and Collection

3.4.1 Harvest & Collection Practices & Schedules

Rationale: Differences in harvest timing and practices used can create risk to both the quantity and quality of 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.

For example, agricultural feedstocks and energy crops have optimal harvesting windows to ensure minimal moisture content. In certain BDO Zones, these harvesting windows may coincide with heightened weather risks, such as frost or rain.

For forestry biomass, unsightly clear-cuts and slash piles (even on plantation forests and especially when located near communities) can provoke unwanted public backlash even when suitable and sustainable replanting regimes are followed.

Risk Information: The existence of large consumers of wood fiber (i.e., saw timbers, pulpwood, and sawmill residues), in particular sawmills and the pulp and paper mills, have resulted in the development of well-established harvest and collection practices in the Supply Zone.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**

[23] Bergtold, 2018.

Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

3.4.2 Harvesting & Collection Equipment

Rationale: Different types of harvesting and collection equipment used by suppliers in a BDO Zone can have a significant impact on the quality and availability of feedstock. Using different types and combinations of harvesting, collection, and processing equipment among suppliers can lead to non-homogeneous feedstock. Equipment that is not designed specifically for biomass cultivation, harvesting, and collection can increase feedstock quality risks.

Relevant equipment should be specified for the sake of product consistency and risk reduction.

Risk Information: The equipment used for harvesting and processing wood fiber (i.e., saw timbers, pulpwood, sawmill residues, and forest residues) is commonly used in the US Southeast including the Supply Zone.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

3.4.3 Variation 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. Standard feedstock densification modes for biomass consist of round or square bales, pellets, cubes, chips, or grindings. The size of wood fiber processed in a grinder is less homogenous than if a chipper is used.

Bales of different densities can absorb moisture at different rates. In certain cases, round bales have been viewed as problematic due to their uneven moisture content distribution.

Risk Information: No densification methods are used by the suppliers. Woody biomass is delivered in ground/chipped forms.
Raw Risk Likelihood (RRL) **Score**
The risk likelihood is deemed very low, therefore the RRL is 2 out of 10. **2**
Raw Risk Impact (RRI) **Score**
The risk impact is deemed very low, therefore the RRI is 2 out of 10. **2**
Gross Risk Indicator (GRI) **Score**
The Gross Risk Indicator (RRL X RRI) is 4 out of 100. **4**
Mitigation/Notching **Notch**
RRL Mitigation (Notch) **NN**
No adjustment.
RRI Mitigation (Notch)
No adjustment.
The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).
Loaded RI Score **Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 4 out of 100. **4**

3.4.4 Availability of Labor for Feedstock Production

Rationale: Skilled labor shortages can be difficult to remedy in the short term. The availability of suitable labor in an area can impact the ability to procure sufficient feedstock quantities on required schedules. Labor risks are higher where supply chains are not yet active or for Issuers for whom large feedstock requirements or the development of new (or expanded) supply chains demand significant additions to the local labor force.

Risk Information: The Macon County BDO Zone has a rich pool of skilled workforce who are supporting the existing forest industry with academic programs that support the training of future generations of the forestry workforce. There are currently 71 logging companies (280% more than the US average) with 330 logging equipment operators (333% more than the US average) in the BDO Zone. In addition, there are three universities and colleges that offer six forestry degree programs with more than 40 graduates annually. The number of logging equipment operators increased by 17% from 2013 to 2017.[24] However, a large number of operators would be needed to harvest and transport rated quantities of pulpwood and forest residues (150 logging operators and 115 truck drivers- see operational considerations in Section B).

In our discussion with the Alabama Forest Commission, they estimated about 30% of the pulpwood-rated quantity could be harvested using the existing logging capacity. There are concerns about the future expansion of the forest industry in the US Southeast, including the Supply Zone. According to a survey that was conducted in 2023,[25] the average age of the logging business owners was 56, and the average age of employees was 48. About 35% of owners expected to exit the industry within five years, given the current challenges, including increasing operating and equipment costs, the lack of labor and truck drivers.

The availability of labor for feedstock production in the Supply Zone will be a very high risk in short and mid-terms for large biomass projects. Given the history of successful scale-up of the primary and secondary forest industries, the labor shortage risk will be mitigated in the long term as the new biomass projects develop in the Supply Zone. The state of

[24] Macon County Economic Development Authority
[25] Bowman, T., Jeffers, S., & Naka, K. (2023). Characteristics and concerns of logging businesses in the southeastern United States: Results from a state-wide survey from Alabama. *Forests*, *14*(9), 1695.

Alabama has been proactive in recruiting and training new laborers for logging, trucking, and milling operations by establishing the ForestryWork organization.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed very high, therefore the RRL is 10 out of 10.	**10**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed medium, therefore the RRI is 6 out of 10.	**6**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 60 out of 100.	**60**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 60 out of 100.	**60**

3.5 Risk Factor: Transportation

3.5.1 Feedstock Transportation Costs

Rationale: Transportation can be one of the most significant cost components of biomass supply chains. The average transport cost and percentage of total feedstock cost attributable to transport should be known.

Transport distances of 80-120 km for biomass feedstocks are typical, but larger distances can be common. Where the average transport distance from suppliers to Issuers 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 scarce feedstock from competitors closer to the source.

Understanding average transport distance can help flag higher-risk BDO Zones where transport distance materially exceeds the average.

Risk Information: As discussed in Risk Indicator 3.1.2, we expect the marginal cost of feedstocks to be low in the Supply Zone due to the fairly even distribution of available woody biomass. As shown in Figure B-3, pulpwood and forest residues availability in the Supply Zone increases gradually in 5-mile driving distance intervals. Cost increases resulting from a supply radius expansion are therefore expected to be gradual. The haul rate is $0.4/bdt/loaded mile for the first 36 miles, with the incremental haul rate of $0.36/bdt/loaded mile for additional haul distances.[26] Each 5-mile driving distance adds about $2/bdt to the delivered price. Despite competitive and consistent biomass hauling rates, haulers may implement a fuel surcharge during periods of high fuel prices.

This risk is deemed medium as all industries are affected by higher transportation costs at times of rising fuel costs.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed medium, therefore the RRL is 6 out of 10.	**6**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed medium, therefore the RRI is 6 out of 10.	**6**

[26] TimberMart-South, Q3 2024

Gross Risk Indicator (GRI)	Score
The Gross Risk Indicator (RRL X RRI) is 36 out of 100.	36
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	NN
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 36 out of 100.	36

3.5.2 Diesel Cost Impacts

Rationale: Changes in diesel costs impact transport costs over time. Sensitivities to worst-case scenarios should be run.

Risk Information: Transportation companies usually add a fuel surcharge on top of the current rate when the cost of fuel exceeds a defined level (i.e., fuel price baseline). In the high price of diesel in 2021-2022, a fuel surcharge of 15-40% was observed resulting in a $3-$8/odt increase in biomass delivered cost, which is considered a medium/high impact depending on the distribution of biomass in the supply area and the future biomass facility biomass demand. In addition to the transportation, diesel prices impact the in-forest operations, including felling, skidding, and loading equipment.

Since 2016, diesel fuel prices in the US South have generally exhibited an upward trend, as depicted in Figure E-5. The lowest recorded price was just below $2.00 per gallon in 2016, while the highest reached $5.73 in 2022. These price variations closely mirror the national average for diesel. Consequently, changes in diesel prices can exert a significant influence on the overall delivered cost of biomass.

Biomass projects usually consider the impact of inflation and rising energy prices in their financial models. In addition, securing biomass from economic driving distances can mitigate the rising fuel prices to some extent. This risk is deemed to be medium.

Raw Risk Likelihood (RRL)	Score
The risk likelihood is deemed medium, therefore the RRL is 6 out of 10.	6
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed medium, therefore the RRI is 6 out of 10.	6
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 36 out of 100.	36
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	NN
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 36 out of 100.	36

3.5.3 Transportation of Feedstock Requires Specialized Equipment

Rationale: Requirements for specialized transport equipment (e.g., walking-floor trailers) can increase supply chain risk. Where there is low availability of required transportation equipment, equipment owners have increased leverage over transportation prices and supply chain resiliency can be lower.

Risk Information: Regardless of the types of woody biomass, they all need to be reduced in size (grinding, shredding, chipping) and then transported by chip vans. Prior to chipping, harvested pulpwood is transported by logging trucks. Thus, there is no need for specialized equipment to transport woody biomass in the supply Zone.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed very low, therefore the RRL is 2 out of 10.	**2**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed very low, therefore the RRI is 2 out of 10.	**2**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 4 out of 100.	**4**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 4 out of 100.	**4**

3.5.4 Delivery Routes through Local Communities

Rationale: Transportation of biomass can become a nuisance to local communities, especially if a large number of trucks pass through residential and school areas. Local communities often have the power to force regulations regarding truck transport, impeding the ability of BDO Zone suppliers to transport feedstock.

Risk Information: The forest industry, including logging, trucking, and manufacturing, provides much-needed employment and growth opportunities to the rural parts of the Supply Zone. The local communities are very supportive of the forest industry. We did not find any past public objections against the use of roads by the forest industry.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

3.5.5 Transportation Regulations & Local Weight Limits

Rationale: In many BDO Zones, 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.

Risk Information: The weight limit for trucks in Alabama is 80,000 lbs. In 2022, the Rural Logging Support Act, also known as House Bill 368 in Alabama, was introduced to increase weight limits by 10% but failed to pass. This bill aimed to increase the weight limits for logging trucks, which was seen as a potential solution to alleviate the supposed truck driver shortage. However, it also raised concerns about how such increases would impact road conditions and safety.

Overall, there are no transportation regulations in the Supply Zone that put the region in a disadvantaged position compared to other major forest regions in the country.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

3.5.6 Road Infrastructure

Rationale: Feedstock cost and availability can be a function of road infrastructure, in particular the accessibility the infrastructure provides to feedstock. Issues with road networks will translate directly to risks to feedstock supply.

Risk Information: Access to timberlands is not limited because of road infrastructure. Alabama forestry has been practiced for decades, with most areas already undergoing one or more harvests. Loggers generally use equipment to clear roads if needed. The state also provides some funding to maintain road infrastructure. However, with the large rated quantity of pulpwood, the existing local road infrastructure needs to be future developed, in particular the forest roads.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed medium, therefore the RRL is 6 out of 10.	**6**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed medium, therefore the RRI is 6 out of 10.	**6**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 36 out of 100.	**36**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment.	**NN**

RRI Mitigation (Notch) No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).
Loaded RI Score **Score** The Loaded RI Score ((1-Total Notch) X GRI Score) is 36 out of 100. **36**

3.5.7 Transportation Redundancy

Rationale: Transport equipment redundancy is important for dealing with seasonally variable feedstock supplies as well as the risk of equipment breakdowns.

Risk Information: As discussed in Risk Indicator 3.4.4, a large number of truck drivers would be needed to haul the rated quantities of pulpwood and forest residues (115 truck drivers). Logging truck drivers are already in short supply in Alabama and the US Southeast in general. More rigorous requirements for certification and increased insurance rates have impacted the availability of qualified logging truck drivers, posing a challenge to the industry. Consequently, we assess the likelihood of this risk as high.

While hiring additional log truck drivers may be a challenge, it is somewhat mitigated by the fact that facility construction and ramp-up to full production will likely take place over two to four years. This extended timeline allows new companies to recruit and train new logging truck drivers. As mentioned before, the ForestryWork organization has been recruiting and training new laborers for logging, trucking, and milling operations in Alabama.

Raw Risk Likelihood (RRL) **Score** The risk likelihood is deemed very high, therefore the RRL is 10 out of 10. **10**
Raw Risk Impact (RRI) **Score** The risk impact is deemed medium, therefore the RRI is 6 out of 10. **6**
Gross Risk Indicator (GRI) **Score** The Gross Risk Indicator (RRL X RRI) is 60 out of 100. **60**
Mitigation/Notching **Notch** *RRL Mitigation (Notch)* **NN** No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).
Loaded RI Score **Score** The Loaded RI Score ((1-Total Notch) X GRI Score) is 60 out of 100. **60**

3.6 Risk Factor: Supply Chain Resiliency

3.6.1 Size, Number, and Location of Suppliers

Rationale: In general, a supply portfolio involving multiple suppliers of various sizes (and from multiple BDO Zones) is important for ensuring steady and uninterrupted feedstock supply with minimal price fluctuations. If a small number of large suppliers provides a high proportion of total feedstock, a disruption or supplier breach will have greater impact on the supply chain. In such cases the risk of disruption is lower, but the impact of those disruptions is higher. Conversely, many small suppliers are less likely to have the capacity to withstand internal disruptions and thus may be more likely to breach. Here, risk of disruption is higher, but their likely impact is lower. The number of suppliers as well as the ratio of small to large suppliers should be optimized.

There is no pre-determined number or optimal ratio of suppliers, although having too many or too few can both pose higher degrees of risk.

Risk Information: The Supply Zone has experienced an increase in the sawmilling production capacity in the last decade. This is due to the abundance of sustainable and affordable timber supply, a supporting tax regime in the state of Alabama for the manufacturing industry, and other supports such as training and recruiting logging, trucking, and milling workforce by the ForestryWork organization. In 2024, 10 sawmills were operating with a production capacity of 1,238 MMBF. Nine of these sawmills have a large production capacity (30-300 MMBF). With the addition of a new sawmill in 2025, this capacity is projected to reach 1,438 MMBF (16% increase in the sawmilling capacity).

In addition, there is a large pool of logging companies in the Supply Zone that are meeting the sawtimber and pulpwood demands of the primary and secondary forest companies, as discussed in Risk Indicator 1.4.1.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

3.6.2 Suppliers Subject to Same External Risk Factors

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 spatial location (i.e., geography), production practices and other elements of supply chain structures such that the impact of single high-risk events have varying impacts on suppliers.

Risk Information: External factors such as lumber prices, forest fires, and insect outbreaks can impact the feedstock production by the suppliers. However, the historical data in the Supply Zone clearly shows that healthy and sustainable sources of woody biomass in the Supply Zone have resulted in a thriving forest industry in the Supply Zone.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)*	**NN**

No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**Score** **16**

3.6.3 Land Ownership Structures

Rationale: The ownership (or control) of the land base on which feedstock is produced can have a significant impact on the Issuer's feedstock risks. Risk of long-term variation in stumpage cost for wood fiber (i.e., the cost that one pays to a landowner for the right to cut and purchase their wood fiber), for example, is much higher in the US, where >90% of the land is private, and thus stumpage cost is determined on a competitive auction basis.

Risk Information: As mentioned in Risk Indicator 1.3.1, approximately 94% of the timberlands within the Supply Zone are owned by the private sector. Private landowners, which include both forest industry and nonindustrial private entities, have always owned the majority of Alabama's forests, including the Supply Zone. This ownership pattern is highly favorable with respect to accessing open-market timber and biomass for industrial purposes.

Raw Risk Likelihood (RRL) The risk likelihood is deemed very low, therefore the RRL is 2 out of 10.	**Score** **2**
Raw Risk Impact (RRI) The risk impact is deemed very low, therefore the RRI is 2 out of 10.	**Score** **2**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 4 out of 100.	**Score** **4**

3.7 Risk Factor: Climate and Natural Risks

3.7.1 Seasonal Weather Impacts on Feedstock Supply

Rationale: Seasonal weather impacts are defined as those deriving from natural weather variations (i.e., spring thaws, rainy seasons, or dry seasons – as opposed to from singular weather events like fires, droughts, or hurricanes). Seasonal weather changes can be a significant risk factor affecting feedstock availability, quality, and price.

Given the major influence that weather has on multiple aspects of growing, harvesting, and transporting biomass, it is difficult to predict the availability of biomass at a specific location at different points in the future with a high degree of certainty. However, it is still possible, using past data and statistical models, to generate reasonable upper/lower bound estimates of biomass production in any given year in a wider supply zone. Such estimates are important in assessing feedstock risk and enable accurate assessment of the efficacy of Issuer's mitigation methods.

Risk Information: Timber harvests in the Supply Zone occur throughout the year, with the winter and spring months typically experiencing higher precipitation levels. This can occasionally limit loggers' ability to transport harvested timbers to the wood processing facilities. However, these limitations are generally temporary and of short duration. During the wetter winter and spring periods, loggers may be redirected to "wet weather" tracts, which are typically

situated on higher ground or have sandy/sandy loam soils that are more resilient in wet conditions. Conversely, the fall season tends to be drier, allowing forest companies to accumulate inventory in preparation for the upcoming winter and spring months.

Due to the large rated quantity of pulpwood and lack of established harvesting and collection operations for forest residues, this risk is deemed to be medium for large biomass projects.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed medium, therefore the RRL is 6 out of 10.	**6**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed medium, therefore the RRI is 6 out of 10.	**6**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 36 out of 100.	**36**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 36 out of 100.	**36**

3.7.2 Long-Term Weather and Climate Trends

Rationale: In certain BDO Zones, climatic trends and significant potential changes to future weather patterns can create feedstock risk.

Risk Information: Climate change can disrupt forest operations, resulting in various challenges such as tree growth rate, tree mortality, outbreaks of pests or diseases, and alterations in water availability. To address these potential impacts, researchers in Alabama's forestry sectors are actively implementing measures to mitigate future risks.

These measures encompass promoting forest management practices aimed at maximizing overall forest health. Additionally, efforts include ongoing monitoring of forestry operations to ensure the correct implementation of Best Management Practices (BMPs),[27] which are designed to minimize environmental impacts. Furthermore, researchers are consistently engaged in developing new varieties of forest plantation stock that demonstrate resilience to the stresses induced by climate change.

In our discussion with the local experts, outbreaks of pests, in particular the southern pine beetle, were highlighted as a long-term weather-related risk that can impact the living timber inventory. Although this risk has happened in the Supply Zone, the southern pine beetle has shown a dramatic decline in outbreak activity over much of the southeastern United States.[28] The expansion of intensive pine silviculture is expected to continue mitigating this risk.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed high, therefore the RRL is 8 out of 10.	**8**
Raw Risk Impact (RRI)	**Score**

[27] Alabama's Best Management Practices for Forestry
[28] Why have southern pine beetle outbreaks declined in the southeastern U.S. with the expansion of intensive pine silviculture? A brief review of hypotheses, 2017.

The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 32 out of 100.	**Score** **32**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 32 out of 100.	**Score** **32**

3.7.3 Forest/Crop Fire

Rationale: Forest/crop fires, especially when occurring on a large scale, destroy feedstock and create shortages.

Fire-prone conditions are predicted to increase. This could potentially result in a doubling of the amount of area burned by the end of this century compared with amounts burned in recent decades. Boreal forests, which have been historically greatly influenced by fire, will likely be especially affected by this change.

Other climate change impacts that could add damaged or dead-wood to the forest fuel load (e.g., as a result of insect outbreaks, ice storms, or high winds) may increase the risk of fire activity. New research is aimed at refining these climate change estimates of fire activity and investigating adaptation strategies and options to deal with future fire occurrences. There is growing consensus that as wildfire activity increases, fire agency suppression efforts will be increasingly strained.

Risk Information: Wildfires happen in the Supply Zone year-round but their size and intensity have not had a significant impact on the timber inventory due to the precipitation in the warm months of the year. In 2024, wildlife firefighters responded to 32 wildfires in the BDO Zone. The number of wildfires in 2023 was 23.[29] In our discussion with the Alabama Forestry Commission, they confirmed that wildfires are not a serious threat to the timber inventory in the Supply Zone.

Although wildfires burn thousands of acres of forestlands in the state every year, through the efforts of the Forestry Commission and local volunteer fire departments, those wildfires are decreasing. The Forestry Commission has a modern, aggressive detection system that allows the discovery and suppression of wildfires in the most efficient way possible. A fleet of airplanes regularly patrols over the forest and looks for wildfires. In addition, the public can report wildfires 24 hours a day through a toll-free telephone system. When a fire is reported, a dispatch center sends Forestry Commission crews and volunteer fire departments as needed to suppress it.

Raw Risk Likelihood (RRL) The risk likelihood is deemed high, therefore the RRL is 8 out of 10.	**Score** **8**
Raw Risk Impact (RRI) The risk impact is deemed low, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 32 out of 100.	**Score** **32**
Mitigation/Notching	**Notch**

[29] Alabama Forestry Commission- Current Wildfire Totals

RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 32 out of 100.	**Score** **32**

3.7.4 Risk of Infestation

Rationale: Risk of future infestation, including its estimated consequences on feedstock supply, should be calculated into the overall risk profile.

Since forest insect populations are influenced by environmental conditions, future changes in climate can be expected to significantly alter the outbreak dynamics of certain forest insect species. In some cases, larger and more frequent insect outbreaks may occur, but in other cases, recurring outbreaks may be disrupted or diminished. As climate continues to change, we can expect more situations, particularly at the margins of tree ranges, where sub-optimal conditions for tree growth and reduced tree vigor can lead to outbreaks of forest insects.

Risk Information: The southern pine beetle (SPB) and other pine bark beetles continue to represent the most significant threat to pine timber in Alabama and the South. The Alabama Forestry Commission monitors SBP activity annually and takes measures to thwart its spread. While pests are an ongoing concern, this threat has not changed significantly in recent years. As discussed in Risk Indicator 3.7.2, the southern pine beetle has shown a dramatic decline in outbreak activity over much of the southeastern United States.[30] The expansion of intensive pine silviculture is expected to continue mitigating this risk.

Raw Risk Likelihood (RRL) The risk likelihood is deemed high, therefore the RRL is 8 out of 10.	**Score** **8**
Raw Risk Impact (RRI) The risk impact is deemed low, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 32 out of 100.	**Score** **32**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 32 out of 100.	**Score** **32**

3.7.5 Risk of Hail

Rationale: Hail has negligible impact on forestry biomass but is one of the principal destroyers of agricultural crops in North America.

[30] Why have southern pine beetle outbreaks declined in the southeastern U.S. with the expansion of intensive pine silviculture? A brief review of hypotheses, 2017.

There is much uncertainty about the effects of anthropogenic climate change on the frequency and severity of extreme weather events like hailstorms and their subsequent economic losses. Some studies indicate a strong positive relationship between hailstorm activity and hailstorm damage, as predicted by minimum temperatures using simple correlations. This relationship suggests that hailstorm damage may increase in the future if global warming leads to further temperature increases.

Risk Information: While hail may occur in the Supply Zone, it is rare and does not significantly impact woody biomass feedstock or supply chains.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

3.7.6 Risk of Flood

Rationale: Floods can cause catastrophic disruption and delay in feedstock supply. Where there is high risk of flood and thus negative impact to feedstock supply, the BDO Zone rating should account for this risk.

Risk Information: The BDO Zone is designated as an area of minimal flood hazard by The Standard for Climate Risk Financial Modeling.[31]

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**

[31] https://firststreet.org/county/macon-county-al/1087_fsid/flood

The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	16

3.7.7 Risk of Drought

Rationale: Droughts can cause significant disruptions to feedstock supplies across entire BDO Zones for extended periods of time, especially in case of agricultural residues and energy crops.

Tree species are adapted to specific moisture conditions. Having less water available through drought has a range of negative impacts on the health of forest ecosystems. Direct impacts include reduced growth, increased tree mortality, and failure to regenerate. Indirect impacts include reduced ability to defend against insects and disease and increased fire risk. These impacts can affect the availability of wood fiber for an Issuer.

Risk Information: The Supply Zone has a temperate climate with warm summers and mild winters. The summer months are often quite humid, with temperatures averaging in the mid-80s. Precipitation occurs throughout the year, with the most rain occurring in the late spring and early fall months, reducing the risk of severe drought and wildfires.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

3.7.8 Risk of Hurricanes, Tornadoes, and Strong Winds

Rationale: Hurricanes, tornadoes, and strong winds can destroy timber stands, crops, and feedstock piles. They can also delay forestry and agricultural operations. Hurricanes and tornadoes can indirectly cause temporary shortages of available transportation as available trucking moves to handle higher-value disaster-related contracts. For example, Katrina cleanup limited availability of live-bottom trailers in the North and South-East of the US for several months as truckers shifted operations to handle more lucrative government contracts.

Although scientists are uncertain whether climate change will lead to an increase in the number of hurricanes, warmer ocean temperatures and higher sea levels are expected to intensify their impacts.

Recent analyses conclude that the strongest hurricanes occurring in some BDO Zones, including the North Atlantic, have increased in intensity over the past two to three decades.

Risk Information: The BDO Zone is rated low-medium risk for the occurrence of tornadoes and strong winds in Alabama (see Figure E-6). In our discussion with local experts, they confirmed that the occurrence and impact of strong winds on forestry operations and logistics have not been significant.

Raw Risk Likelihood (RRL)	**Score**

The risk likelihood is deemed medium, therefore the RRL is 6 out of 10.	**6**
Raw Risk Impact (RRI) The risk impact is deemed low, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 24 out of 100.	**Score** **24**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 24 out of 100.	**Score** **24**

3.7.9 Risk of Low Temperatures

Rationale: Low temperatures can cause crop failure, leading to shortages of biomass. Additionally, low temperatures can have adverse impacts on the operations of feedstock processing equipment in Northern BDO Zones.

Risk Information: The timber species currently present in the Supply Zone are native and well-suited to the regional climate. Over the course of the year, the temperature typically varies from 39°F to 92°F and is rarely below 25°F or above 97°F. There is a very low chance of freeze damage for the forest species grown in the Supply Zone.

Raw Risk Likelihood (RRL) The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**Score** **4**
Raw Risk Impact (RRI) The risk impact is deemed low, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**Score** **16**

3.8 Risk Factor: Political and Social

3.8.1 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 subsidies only; it does not apply to government subsidies that pertain indirectly to the Issuer's operations, such as Loan Guarantees, or to the markets for products produced by the Issuer.

Risk Information: There are no government subsidies for the production and use of woody biomass in the Supply Zone.

Raw Risk Likelihood (RRL) The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**Score** **4**
Raw Risk Impact (RRI) The risk impact is deemed low, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**Score** **16**

3.8.2 Local, Provincial, & National Laws, Regulations, & Permitting Pertaining to Biomass

Rationale: Feedstock whose production is 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 biomass utilization 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.

Risk Information: The Alabama Department of Environmental Management (ADEM) will be the source for air and water permits. The agency adheres to all EPA standards in permitting. Unlike some states, ADEM does not have added standards that go beyond federal regulations. Therefore, permitting in Alabama will be at EPA-standard levels, which will be consistent across industries.

Raw Risk Likelihood (RRL) The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**Score** **4**
Raw Risk Impact (RRI) The risk impact is deemed low, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**Score** **16**

3.8.3 Backlash Against Biomass Development, Procurement, or Usage in the Region

Rationale: Public backlash against biomass development in the Issuer BDO Zone can directly impact Issuer's ability to procure, transport, trans-load, store, or utilize feedstock by affecting local policies, regulations, and Issuer's ability to obtain necessary permitting.

Risk Information: Forestry is the main industry in the Supply Zone, with strong support from the local governments and the public. Although there has been a backlash against wood pellet production in the Southeast USA, the opposition is coming from not-for-profit organizations located outside of the region.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

3.8.4 Consent of, and Cooperation with, Indigenous Communities and First Nations

Rationale: Where new project development on or near Indigenous or First Nation land, or where near Indigenous or First Nations exert influence over feedstock producing areas, consent of, and cooperation with, Indigenous communities and First Nations decreases Issuer risk.

Risk Information: There is not a large amount of Native American-owned forest in the state of Alabama. The Poarch Band of Creek Indians have about 16,000 acres of forest land in Escambia County in Southwest Alabama, which is not part of the Supply Zone.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

3.8.5 Food Security Concerns

Rationale: Despite the fact that any significant correlation between food prices and biofuel production is unclear, claims that biofuel production has driven up food prices, taken food from communities or had a negative impact on land use can fuel public backlash. For example, the removal of biomass may raise public concerns relating to food security if Issuer feedstock requires the use of land that would otherwise be used for growing food.

Risk Information: Using woody biomass for the production of bio-based products does not impact food markets and is thus irrelevant to the BDO Zone.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed not relevant, therefore the RRL is not rated (NR).	**NR**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed not relevant, therefore the RRI is not rated (NR).	**NR**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is not rated.	**NR**
Mitigation/Notching	**Notch**
The Total Notch (RRL Notch) X (RRI Notch) is NR (Not Rated).	**NR**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is not rated.	**NR**

3.9 Risk Factor: Sustainability and Environmental Concern

3.9.1 Feedstock Sustainability

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.

Risk Information: The forestry operations within the Supply Zone exhibit robust management practices, undergoing regular audits to ensure compliance with Best Management Practices (BMPs).[32] Alabama, having instituted forestry BMPs in 1975, continues to assess their application yearly. BMPs serve as guidelines for preserving forest health, emphasizing soil and water considerations during forest management and harvesting. The Alabama Forestry Commission supports forest certification by third-party agencies such as the Forest Stewardship Council (FSC), the Sustainable Forestry Initiative (SFI), the TREASURE Forest Program, and the Tree Farm Program.[33] The high level of BMP observance is an advantage to new projects.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment.	**NN**
RRI Mitigation (Notch)	

[32] Alabama's Best Management Practices for Forestry
[33] The Need for Forest Certification

No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).
Loaded RI Score **Score** The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100. **16**

3.9.2 Risk to Soil Quality

Rationale: Soil sustainability can be defined as the management of soil in a way that does not exert any negative or irreparable effects either on the soil itself or any other systems. There is a diversity of approaches to soil sustainability in jurisdictional guidelines for forest biomass harvesting and production. For different feedstock types, there are also different thresholds at which feedstock removal causes significant negative consequences on the soil.

Poor soil quality that negatively impacts the long-term sustainability of the feedstock can entail long-term feedstock risk. Sub-optimal soil management can leave exposed soil post residue-harvest, which can lead to soil wash-off and soil carbon loss from precipitation and wind. Over-harvesting of biomass also depletes the carbon stock in the soil and creates a negative feedback loop that can degrade the soil and its nutrients.

Risk Information: Best Management Practices (BMPs) include standards to minimize the risk to soil arising from forestry operations. According to a 2019 report from the Alabama Forestry Commission assessing BMP compliance, the statewide implementation of BMPs pertaining to soil-related concerns exceeded 97%. Specifically, practices directly addressing soil quality demonstrated a commendable compliance rate.[34]

Raw Risk Likelihood (RRL) **Score** The risk likelihood is deemed low, therefore the RRL is 4 out of 10. **4**
Raw Risk Impact (RRI) **Score** The risk impact is deemed low, therefore the RRI is 4 out of 10. **4**
Gross Risk Indicator (GRI) **Score** The Gross Risk Indicator (RRL X RRI) is 16 out of 100. **16**
Mitigation/Notching **Notch** *RRL Mitigation (Notch)* **NN** No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).
Loaded RI Score **Score** The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100. **16**

3.9.3 Risk to Surface and Groundwater

Rationale: 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 social and regulatory backlash. Water intake issues can also increase risk.

Risk Information: Best Management Practices (BMPs) address mitigation methods to minimize the risk to water quality resulting from forestry operations. As per a 2019 report on BMP compliance by the Alabama Forestry Commission, the

[34] Alabama Forestry Commission, 2019. Annual Report

statewide implementation of BMPs pertaining to water-related issues surpassed 97%.[35] Notably, practices directly linked to water quality exhibited a commendable compliance rate.
Raw Risk Likelihood (RRL) **Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10. **4**
Raw Risk Impact (RRI) **Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10. **4**
Gross Risk Indicator (GRI) **Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100. **16**
Mitigation/Notching **Notch**
RRL Mitigation (Notch) **NN**
No adjustment.
RRI Mitigation (Notch)
No adjustment.
The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).
Loaded RI Score **Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100. **16**

3.9.4 Water Use

Rationale: Biomass feedstock operations can have significant impacts on the hydrological flux (infiltration, groundwater recharge, interception, and transpiration) of ecosystems. This can lead to water shortages, lower yields, and backlash from regulatory bodies if management plans are not properly instituted.
Risk Information: Changes to the landscape resulting from forestry operations, such as the construction of logging roads and harvest operations, possess the potential to disrupt watersheds. Best Management Practices (BMPs) dictate the methods employed in all facets of forestry operations, aiming to safeguard water quality.
Raw Risk Likelihood (RRL) **Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10. **4**
Raw Risk Impact (RRI) **Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10. **4**
Gross Risk Indicator (GRI) **Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100. **16**
Mitigation/Notching **Notch**
RRL Mitigation (Notch) **NN**
No adjustment.
RRI Mitigation (Notch)
No adjustment.
The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).
Loaded RI Score **Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100. **16**

[35] Ibid.

3.9.5 Pesticide Risk to Human and Ecosystem Health

Rationale: Application of pesticides (i.e., herbicides, fungicides, and insecticides) on agricultural and forest landscapes can result in adverse health effects for humans and ecosystems. If pesticide application is required in feedstock production, the impact must be considered in the BDO Zone rating.

Risk Information: Pesticide use is most prevalent in fruit and nut operations, while their application in timber production is infrequent. The state of Alabama regulates the use of pesticides in timberlands, necessitating a permit and strict adherence to Best Management Practices, with 100% compliance, according to the 2019 assessment.[36]

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

3.9.6 Risk to Wildlife and Landscape

Rationale: Biomass production and supply chain operations with negative impacts on wildlife and landscape are at a greater long-term risk of encountering project setbacks and disruptions.

Risk Information: As mentioned in Risk Indicator 3.9.4, changes to the landscape resulting from forestry operations such as tree planting, forest management, construction of logging roads, and harvest operations possess the potential to disrupt landscapes and wildlife habitats. In Alabama, Best Management Practices (BMPs) dictate the methods employed in all facets of forestry operations, aiming to safeguard water and soil quality, minimize impacts on wildlife and the landscape, and preserve biodiversity. The Alabama Forestry Commission oversees compliance with BMPs, and in the most recent report available, statewide adherence to BMPs stood at 98%.[37]

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed medium, therefore the RRL is 6 out of 10.	**6**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 24 out of 100.	**24**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)*	**NN**

[36] Ibid.
[37] Ibid.

No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).
Loaded RI Score **Score** The Loaded RI Score ((1-Total Notch) X GRI Score) is 24 out of 100. **24**

3.9.7 Biomass Classified as Genetically Modified Organism (GMO)

Rationale: There are various risks associated with GMOs, such as migration or dispersion across the landscape, which can generate community backlash and create supply chain risk. GMOs can also be heavily regulated. If planning to grow or procure GMO feedstocks, especially purpose-grown energy crops, it is important to understand the risks.
Risk Information: Although genetically modified trees have been tested in the southeast USA, none of them are produced commercially. Thus, there is no risk of migration or dispersion across the landscape.
Raw Risk Likelihood (RRL) **Score** The risk likelihood is deemed very low, therefore the RRL is 2 out of 10. **2**
Raw Risk Impact (RRI) **Score** The risk impact is deemed very low, therefore the RRI is 2 out of 10. **2**
Gross Risk Indicator (GRI) **Score** The Gross Risk Indicator (RRL X RRI) is 4 out of 100. **4**
Mitigation/Notching **Notch** *RRL Mitigation (Notch)* **NN** No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).
Loaded RI Score **Score** The Loaded RI Score ((1-Total Notch) X GRI Score) is 4 out of 100. **4**

CATEGORY 4.0: FEEDSTOCK SCALE-UP RISK

4.1 Risk Factor: Feedstock Scale-Up

4.1.1 Feedstock Quality at Production Scale

Rationale: The physical and chemical properties of feedstock used in lab, pilot and field testing can fail to be representative of feedstock generated by large-scale operations. It is important to conduct tests on feedstock representative of that which will be produced by large-scale operations. Failure to adequately test the full range of parameter values can result in severe problems during scale-up.
Risk Information: The Supply Zone has long-established and well-organized supply chains for the production, harvesting, transport, and processing of sawmill residues and pulpwood, which have been used by both primary and secondary wood processing companies for decades. Although the collection of forest residues is not yet a common practice, we anticipate the existing forest industry is expected to possess the capability and experience necessary to manage the quality of forest residues delivered to future biomass projects. The established logistics practices and expertise within the industry are poised to adapt seamlessly to meet the heightened demand for forest residues.
Raw Risk Likelihood (RRL) **Score**

The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI) The risk impact is deemed low, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**Score** **16**

4.1.2 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 Issuer feedstock requirements and throughput capacity. Capacity to scale should be demonstrated.

Risk Information: The sawmill industry has been growing with a nearly 2.5 times increase in the sawmilling capacity in the last 10 years, an indication of the competitiveness of the forest industry in the region and an established knowledge of feedstock production and logistics. Other key elements of the supply chain, including the land base, roads, equipment, and labor, are well-established. According to FIA data, about 7 million bdt of sawtimber and pulpwood have been harvested annually in the Supply Zone in the last 10 years.

However, the shortage of log truck drivers and the aging logging industry is a concern for scale-up. The forest industry has been proactive in mitigating the labor shortage by creating the ForestryWorks organization that aims to create a sustainable pipeline of qualified workers for the forestry and forest products manufacturing industry. In addition, the labor shortage can be alleviated if new businesses are willing to pay attractive wages. The level of risk also depends on the size of the biomass project (annual biomass demand).

Raw Risk Likelihood (RRL) The risk likelihood is deemed medium, therefore the RRL is 6 out of 10.	**Score** **6**
Raw Risk Impact (RRI) The risk impact is deemed medium, therefore the RRI is 6 out of 10.	**Score** **6**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 36 out of 100.	**Score** **36**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 36 out of 100.	**Score** **36**

CATEGORY 5.0: INFRASTRUCTURE RISKS

5.1 Risk Factor: Physical Infrastructure

5.1.1 Land Parcel/Industrial District

Risk Information: The 277-acre parcel near Tuskegee, AL, is available with the gently rolling terrain and access to major highways. The parcel is large enough to accommodate a commercial biomass project.

Raw Risk Likelihood (RRL) The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**Score** **4**
Raw Risk Impact (RRI) The risk impact is deemed low, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**Score** **16**

5.1.2 Ownership of Land

Risk Information: The parcel is owned privately and managed by the Economic Development Authority. This centralized control allows for a streamlined and consistent approach to land transactions, reducing potential complications and ensuring that businesses can secure the property they need with greater ease and reliability.

Raw Risk Likelihood (RRL) The risk likelihood is deemed very low, therefore the RRL is 2 out of 10.	**Score** **2**
Raw Risk Impact (RRI) The risk impact is deemed very low, therefore the RRI is 2 out of 10.	**Score** **2**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 4 out of 100.	**Score** **4**

5.1.3 Permitting Description

Risk Information: The permitting process in Macon County (Tuskegee) is generally straightforward, taking an average of 60-90 days, and designed to accommodate the needs of both residents and businesses. Macon County follows State

regulations and local bylaws, ensuring that all projects comply with safety, environmental, and zoning standards. The city's administration is accessible, and they provide clear guidelines for obtaining necessary permits.
Raw Risk Likelihood (RRL) **Score** The risk likelihood is deemed low, therefore the RRL is 4 out of 10. **4**
Raw Risk Impact (RRI) **Score** The risk impact is deemed low, therefore the RRI is 4 out of 10. **4**
Gross Risk Indicator (GRI) **Score** The Gross Risk Indicator (RRL X RRI) is 16 out of 100. **16**
Mitigation/Notching **Notch** *RRL Mitigation (Notch)* **NN** No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).
Loaded RI Score **Score** The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100. **16**

5.1.4 Environmental Issues

Risk Information: Macon County does not face significant environmental obstacles to new construction and industrial development. The area is classified as a clean air attainment zone, with stringent EPA permitting in place to safeguard air quality. While water quality tests have occasionally detected minor levels of agricultural and industrial pollutants, these remain well within acceptable limits.

The CSX industrial site has had an initial environmental review,[38] showing no primary issues such as wildlife, flood, cultural or soil quality.

For any industrial development in Macon County, particularly projects that may further strain environmental resources or add to pollution, these issues present significant challenges. Careful planning and stringent environmental safeguards would be necessary to mitigate these risks. Potential investors and developers must consider these environmental factors when evaluating the site's suitability for development, especially in industries that are heavily regulated for their environmental impact.

Raw Risk Likelihood (RRL) **Score** The risk likelihood is deemed low, therefore the RRL is 4 out of 10. **4**
Raw Risk Impact (RRI) **Score** The risk impact is deemed low, therefore the RRI is 4 out of 10. **4**
Gross Risk Indicator (GRI) **Score** The Gross Risk Indicator (RRL X RRI) is 16 out of 100. **16**
Mitigation/Notching **Notch** *RRL Mitigation (Notch)* **NN** No adjustment. *RRI Mitigation (Notch)*

[38] https://madeinmacon.com/csx-select-site/

No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

5.2 Risk Factor: Utilities

5.2.1 Natural Gas Availability

Risk Information: The existing natural gas infrastructure is owned and managed by Southern Company Gas, a very large company with extensive assets to serve new industries wanting to locate in the CSX site. There is a natural gas service line along the western edge of the industrial parcel. A meter and connection line would be needed to support a new industry.

As of May 2024, Alabama's industrial natural gas rate was $3.27 per thousand cubic feet, according to Choose Energy.com. This ranks Alabama 9th in the lowest-priced natural gas in the county.[39]

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed medium, therefore the RRI is 6 out of 10.	**6**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 24 out of 100.	**24**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 24 out of 100.	**24**

5.2.2 Electric Availability

Risk Information: Electric power in Macon County is generally reliable, and stable services are provided by Dixie Electric Cooperative. This non-profit 21,000 member-owner has operated since 1938. It manages power from hydro, solar, geothermal, and coal generation facilities.

Average rates in Macon County are 12.14 cents per KWH,[40] on par with the national average. Dixie Electric Cooperative's rates are generally competitive with those in surrounding states. Compared to surrounding states like Georgia, Mississippi, and Florida, Dixie Electric's rates are typically in line with or slightly lower than those offered by investor-owned utilities, thanks to the cooperative's focus on cost-effective operations and a diverse energy mix. There is currently three-phased power available at the CSX site.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**

[39] https://www.eia.gov/dnav/ng/hist/n3035al3a.htm
[40] www.eia.gov/electricity/sales_revenue_price/pdf/table_8.pdf

Raw Risk Impact (RRI) The risk impact is deemed low, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**Score** **16**

5.2.3 Water Availability

Risk Information: Alabama has an abundant water supply, with interconnected surface water and groundwater systems. The Utilities Board of Tuskegee manages the potable and non-potable water resources in the area. They have recently installed upgrades to the supply network, allowing for up to 4,000,000 gallons per day[41] to be available. The CSX site has water piping near its southern edge, which is easily expanded for new industries coming to the parcel.

Raw Risk Likelihood (RRL) The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**Score** **4**
Raw Risk Impact (RRI) The risk impact is deemed low, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**Score** **16**

5.2.4 Waste Disposal

Risk Information: The Tuskegee area offers solid waste disposal, wastewater, and landfill services, with reliable collection and a strong recycling program, all managed by the Utilities Board. While the local landfill (Tuskegee Construction & Demolition Landfill, less than 10 miles from the CSX site) is sufficient for current needs, future growth or increased waste could challenge its capacity. Hazardous waste disposal requires additional consideration, but overall, the town's waste management efforts are effective and environmentally conscious.

Raw Risk Likelihood (RRL) The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**Score** **4**

[41] https://maconwater.org/

Raw Risk Impact (RRI) The risk impact is deemed low, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**Score** **16**

5.2.5 Internet Availability

Risk Information: Macon County offers competitive internet availability and rates with access to broadband services and at least four providers offering both wireless and fiber networks. 5G Internet speed is available in major cities within the County. While adequate for everyday use, the speeds at the CSX site area may not meet the demands of high-bandwidth activities. Users with more intensive internet requirements may notice limitations compared to what is available in larger cities. Overall, Macon County provides acceptable internet options, but there are some trade-offs in speed and service quality, especially for high-demand tasks.

Raw Risk Likelihood (RRL) The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**Score** **4**
Raw Risk Impact (RRI) The risk impact is deemed medium, therefore the RRI is 6 out of 10.	**Score** **6**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 24 out of 100.	**Score** **24**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 24 out of 100.	**Score** **24**

5.3 Risk Factor: Transportation/Logistics

5.3.1 Road/Highway Access

Risk Information: The site is accessed by Alabama State Highway 81, a primary thoroughfare, and is conveniently located less than a mile from Interstate 85 at exit 38. This proximity to a major interstate facilitates easy travel to key cities like Atlanta, GA (125 miles away) and Montgomery, AL. Overall, the CSX site's excellent connectivity to major highways.

Raw Risk Likelihood (RRL) The risk likelihood is deemed very low, therefore the RRL is 2 out of 10.	**Score** **2**

Raw Risk Impact (RRI) The risk impact is deemed very low, therefore the RRI is 2 out of 10.	**Score** **2**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 4 out of 100.	**Score** **4**

5.3.2 Rail Access

Risk Information: As one of only three CSX Select sites in Alabama, the Tuskegee location stands out for its readiness for industrial development. Being served by CSX, the nation's third-largest railroad, the site offers robust rail connectivity.

Raw Risk Likelihood (RRL) The risk likelihood is deemed very low, therefore the RRL is 2 out of 10.	**Score** **2**
Raw Risk Impact (RRI) The risk impact is deemed very low, therefore the RRI is 2 out of 10.	**Score** **2**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 4 out of 100.	**Score** **4**

5.3.3 Airport Access

Risk Information: Moton Field, located just 3 miles north of downtown Tuskegee and less than 5 miles from the CSX industrial site, is a valuable asset for businesses, particularly in the bio-economy sector. Moton Field's 5,000-foot paved runway is well-suited for private and small commercial aircraft, including business jets.

While Moton Field does not offer passenger service, its capability to handle small commercial aircraft can be an advantage for the transport of high-value or time-sensitive cargo, such as specialized equipment, parts, or samples.

For broader connectivity, Montgomery's commercial airport, located 50 miles to the Southwest, provides access to several major airlines and freight services with daily flights to most major U.S. airports. This proximity allows for easy

access to national and international markets, supporting the logistics needs of bio-industries for both importing feedstock and exporting finished products.
Raw Risk Likelihood (RRL) **Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10. **4**
Raw Risk Impact (RRI) **Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10. **4**
Gross Risk Indicator (GRI) **Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100. **16**
Mitigation/Notching **Notch**
RRL Mitigation (Notch) **NN**
No adjustment.
RRI Mitigation (Notch)
No adjustment.
The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).
Loaded RI Score **Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100. **16**

5.3.4 Water Freight Access

Risk Information: This item is not rated for Tuskegee, AL.
Raw Risk Likelihood (RRL) **Score**
The risk likelihood is deemed not relevant, therefore the RRL is not rated (NR). **NR**
Raw Risk Impact (RRI) **Score**
The risk impact is deemed not relevant, therefore the RRI is not rated (NR). **NR**
Gross Risk Indicator (GRI) **Score**
The Gross Risk Indicator (RRL X RRI) is not rated. **NR**
Mitigation/Notching **Notch**
The Total Notch (RRL Notch) X (RRI Notch) is NR (Not Rated). **NR**
Loaded RI Score **Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is not rated. **NR**

5.4 Risk Factor: Social Infrastructure

5.4.1 Healthcare (Local)

Risk Information: Tuskegee offers six primary hospitals to its patrons including the Tuskegee Veterans Administration facility and Bullock County Hospital.[42] Additionally, there are dozens of specialty clinics, urgent care and emergency services providers.
Raw Risk Likelihood (RRL) **Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10. **4**
Raw Risk Impact (RRI) **Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10. **4**
Gross Risk Indicator (GRI) **Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100. **16**
Mitigation/Notching **Notch**

[42] https://maconalabama.com/community/medical_facilities.php

RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**Score** **16**

5.4.2 Education (Schools)

Risk Information: The Macon County School District, serving over 1,800 students[43] offers a robust education with strong academic and extracurricular programs. For higher education, Tuskegee is home to prestigious institutions, most notably Tuskegee University, historically known as the Tuskegee Institute, offering a wide range of undergraduate and graduate programs.

Nearby, Auburn University, located about 20 miles away in Auburn, Alabama, is another major educational institution offering a comprehensive array of programs. Together, these institutions provide a pipeline of educated talent, contributing to a skilled workforce that can support local industries and attract new businesses to the area. Tuskegee University, Auburn University, and Lurleen B Wallace Community College in the BDO Zone offer six forestry degree programs with more than 40 graduates annually.

Raw Risk Likelihood (RRL) The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**Score** **4**
Raw Risk Impact (RRI) The risk impact is deemed low, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**Score** **16**

5.4.3 Local Transportation

Risk Information: The Macon County Public Transportation System in Tuskegee plays a vital role in supporting the mobility of employees, particularly in new and emerging industries. With scheduled bus services within the city and additional transportation options for neighboring communities, this system ensures that workers can efficiently commute to and from their jobs. It also helps reduce traffic congestion and the need for extensive parking infrastructure, making it easier for businesses to manage their operations.

Raw Risk Likelihood (RRL)	**Score**

[43] https://www.usnews.com/education/k12/alabama/districts/macon-county-100147

The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI) The risk impact is deemed low, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**Score** **16**

5.4.4 Public Safety (Local)

Risk Information: The violent crime rate is significantly higher than the national average. According to statistics, the violent crime rate in this county is 51.9,[44] which is more than double the national average of 22.7. The residents of this area may deal with serious offenses, including offenses such as assault, robbery, and homicide. Property crimes, including burglary, theft, and motor vehicle theft, are alarmingly prevalent in Tuskegee.

Raw Risk Likelihood (RRL) The risk likelihood is deemed medium, therefore the RRL is 6 out of 10.	**Score** **6**
Raw Risk Impact (RRI) The risk impact is deemed medium, therefore the RRI is 6 out of 10.	**Score** **6**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL X RRI) is 36 out of 100.	**Score** **36**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) X GRI Score) is 36 out of 100.	**Score** **36**

5.4.5 Housing/Cost of Living

Risk Information: With home prices in Macon County being 80.5%[45] less expensive than the national average and 66% less expensive than the Alabama state average.

Renting in Tuskegee is also highly affordable, with a two-bedroom unit costing around $700[46] per month. This is 51% cheaper than the national average and 38.6% cheaper than the state average. The availability of both homes and rental

[44] https://www.bestplaces.net/crime/county/alabama/macon
[45] Realtor.com June 2024
[46] https://www.rentdata.org/macon-county-al/2023

units is sufficient to accommodate growth, ensuring that as new industries develop and attract workers, housing remains accessible. The combination of affordable living and adequate housing supply supports the area's potential for sustainable growth, making Tuskegee a low-risk and attractive location for new industrial developments.

Macon County's cost of living index is 74.9,[47] compared to 84 for Alabama and 100 for the US. This compliments the lower housing costs and enhances the attractiveness for new workers.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed very low, therefore the RRL is 2 out of 10.	**2**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed very low, therefore the RRI is 2 out of 10.	**2**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 4 out of 100.	**4**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 4 out of 100.	**4**

5.5 Risk Factor: Labor

5.5.1 Workforce

Risk Information: The workforce in Tuskegee, Alabama, is characterized by its dedication, resilience, and growing alignment with emerging industries. As of September 2024, the unemployment rate in Macon County stands at 3.8%,[48] with a labor force of 6,400, which is considered a low unemployment rate and a strong labor market for new industries. There is an increasing focus by the local authorities on developing skills in advanced manufacturing, renewable energy, and the bio-economy. The presence of a robust public transportation system and adequate housing further supports workforce mobility and growth, enabling industries to attract and retain talent effectively.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment.	**NN**

[47] https://www.bestplaces.net/cost_of_living/county/alabama/macon
[48] US Bureau of Labor Statistics

The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

5.5.2 Labor Costs

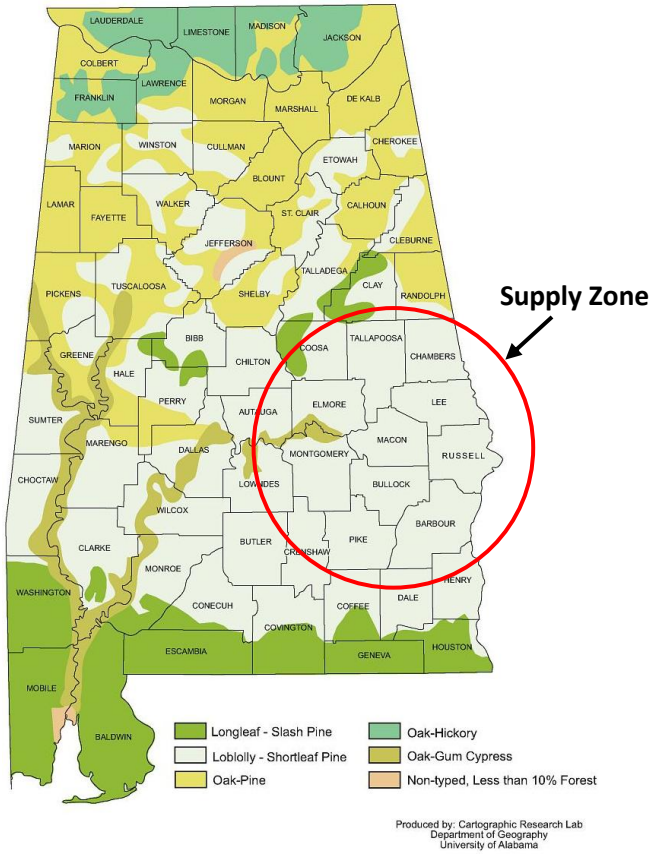
Risk Information: The cost of labor is relatively low, making it an attractive location for businesses looking to manage operational expenses effectively. Alabama does not have a state-specific minimum wage, so the federal minimum wage of $7.25 per hour[49] applies in Macon County. The average salary in Macon County varies depending on the industry, but it generally aligns with the lower cost of living in the area. According to recent data, the median household income in Macon County is $41,200,[50] which is below the national average. This suggests that while wages are lower, they are in line with the cost of living. The combination of the lower minimum wage, average salary, and affordable living costs makes it more economical for businesses to recruit and retain employees.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed low, therefore the RRL is 4 out of 10.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed low, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL X RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment.	**NN**
RRI Mitigation (Notch) No adjustment.	
The Total Notch (RRL Notch) X (RRI Notch) is NN (No Notch).	
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) X GRI Score) is 16 out of 100.	**16**

[49] https://www.dol.gov/agencies/whd/minimum-wage/state
[50] https://www.census.gov/quickfacts/fact/table/maconcountyalabama/PST045222

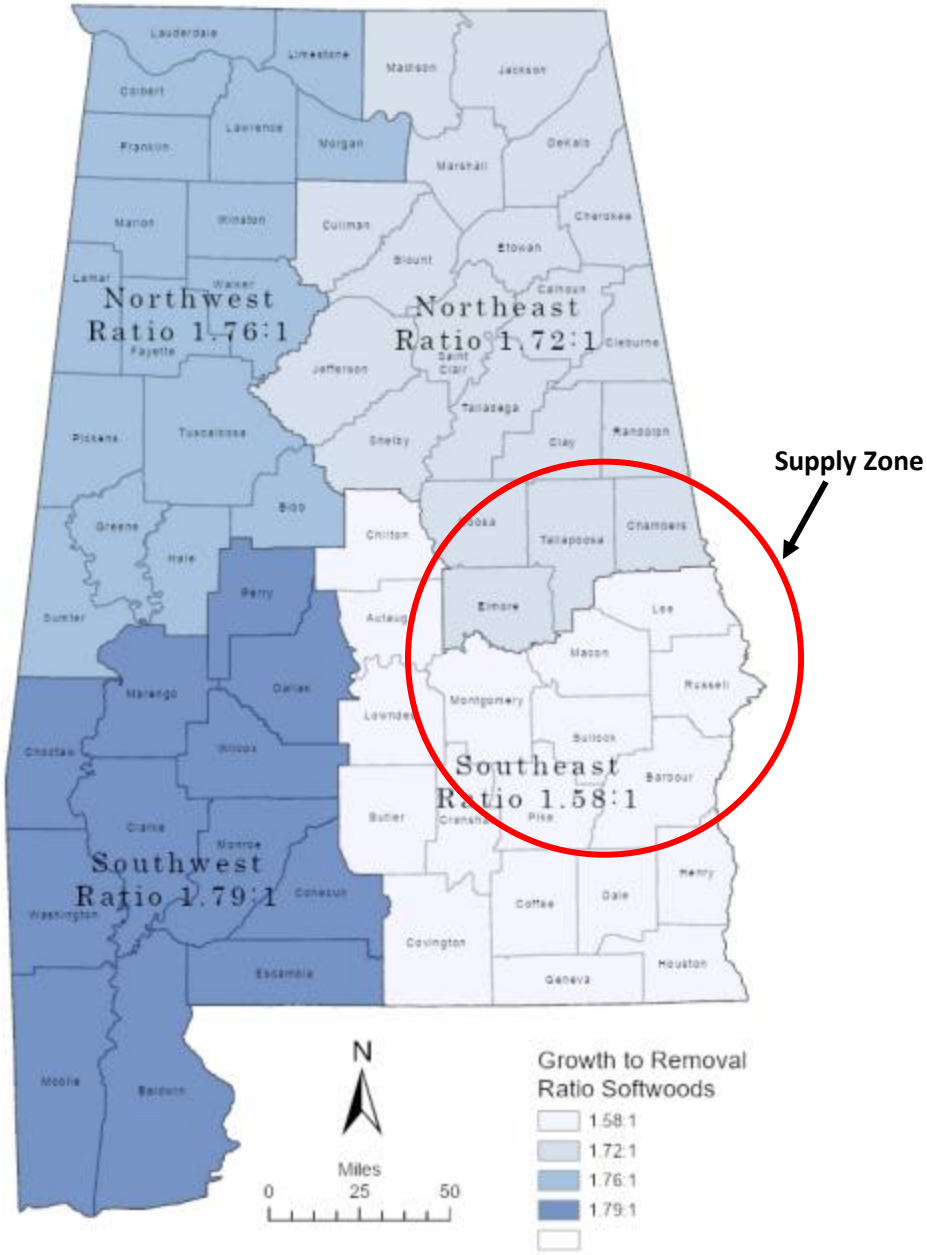
SECTION E: TABLES AND FIGURES

Figure E-1. Alabama Forest Types



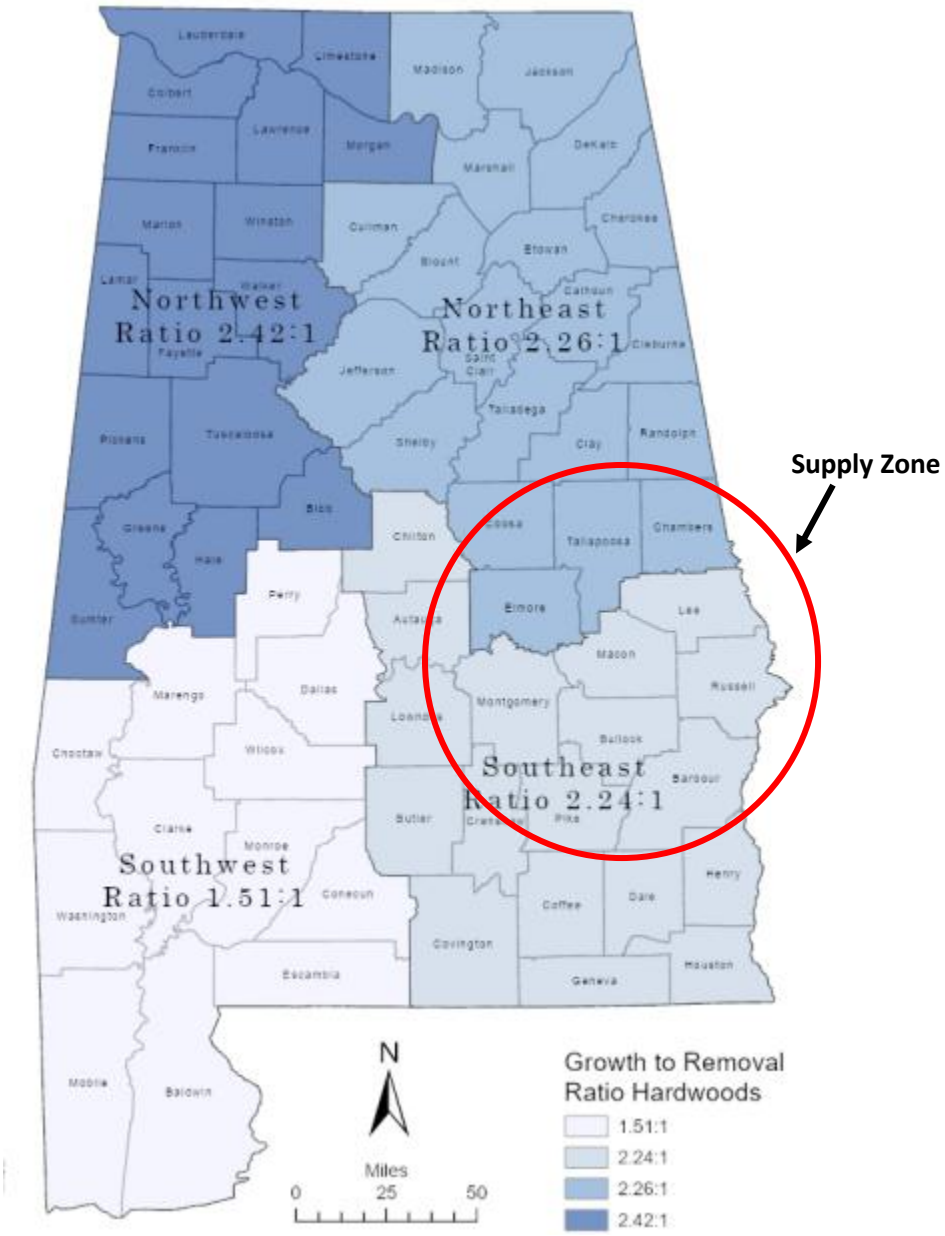
- Approximately 57.5% of the timber inventory in the Supply Zone (Southeast Alabama) is comprised of softwood species, primarily Southern pines, and 42.5% is mixed hardwood species.
- Almost 93% of the pine inventory is loblolly pine (*Pinus taeda*). Shortleaf pine (*Pinus echinata*) is the next most prevalent, at just under 4%.

Figure E-2. Growth to Removal Ratios - Softwood[51]



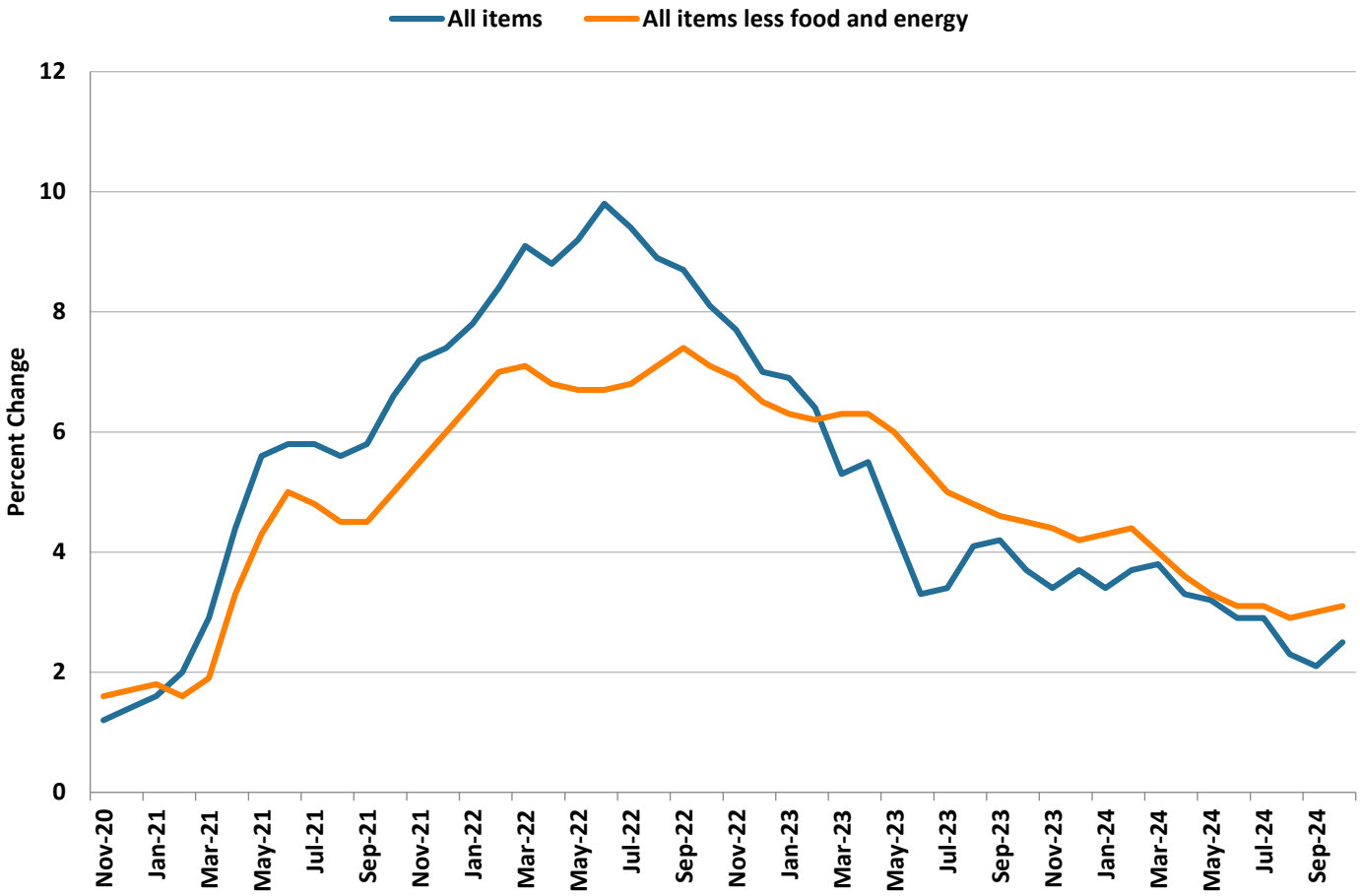
[51] Alabama Forestry Commission, 2021 Forest Resource Report

Figure E-3. Growth to Removal Ratios - Hardwood[52]



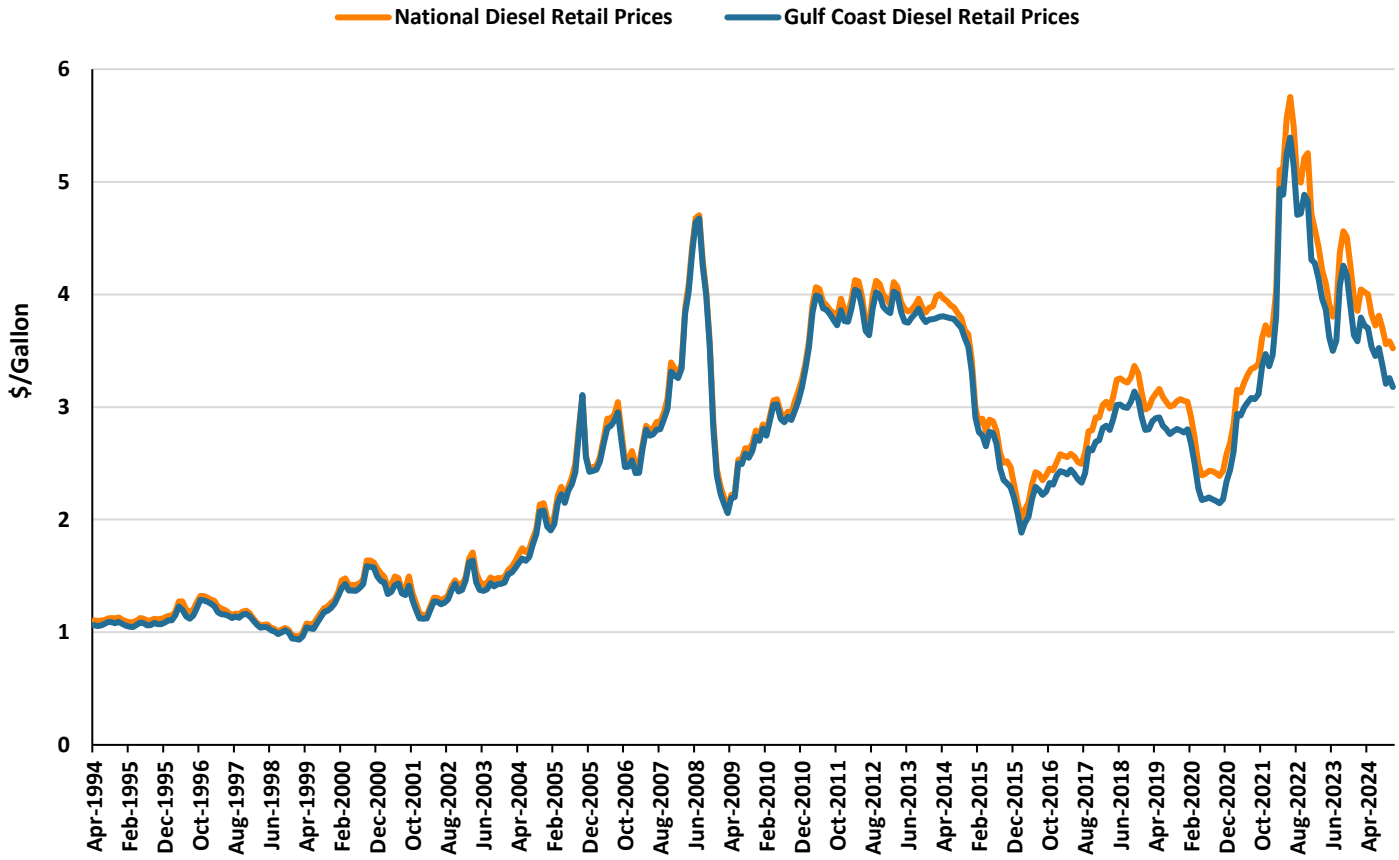
[52] Alabama Forestry Commission, 2021 Forest Resource Report

Figure E-4. Percent Change in Consumer Price Index - US South Region[53]



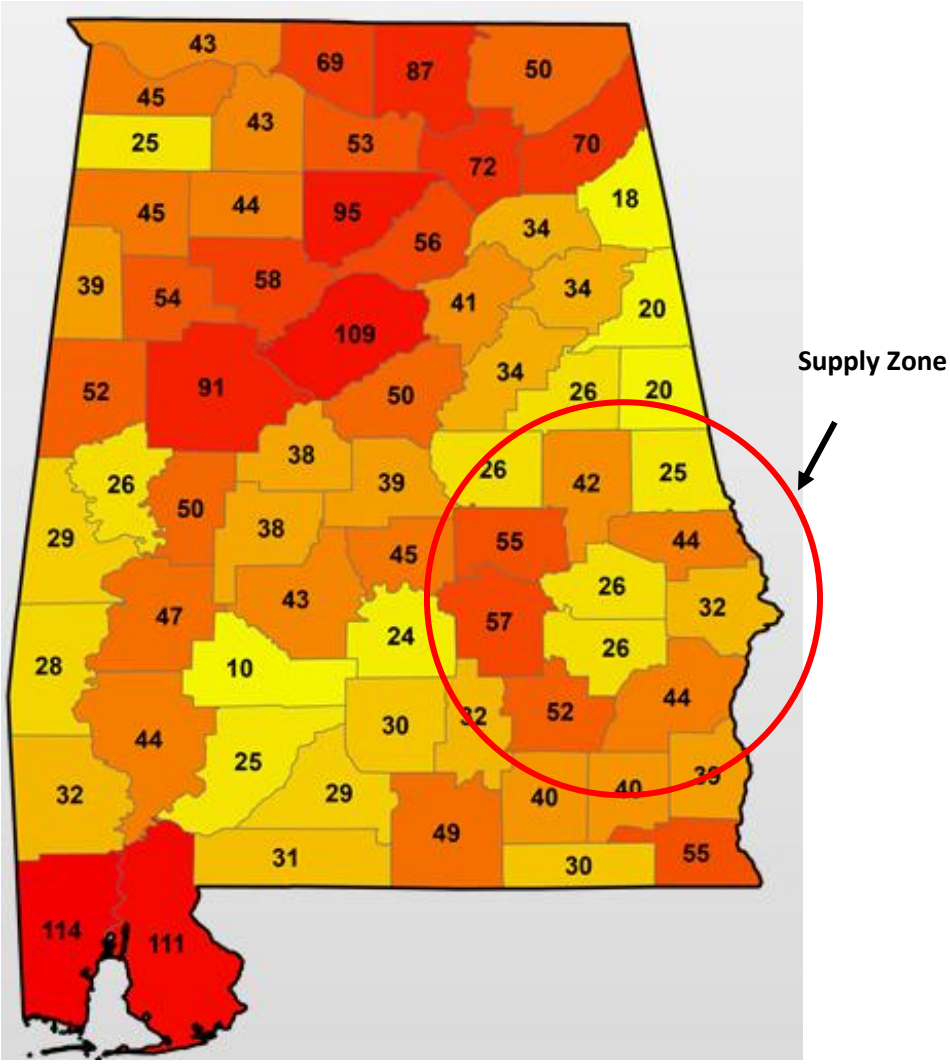
[53] US Bureau of Labor Statistics. https://www.bls.gov/regions/southeast/news-release/ConsumerPriceIndex_South.htm. Accessed Dec 19, 2023.

Figure E-5. Historical diesel price, 1994-2024[54]



[54] US Energy Information Administration, 2024

Figure E-6. Alabama Tornadoes by county, 1950-2023[55]



[55] National Weather Service

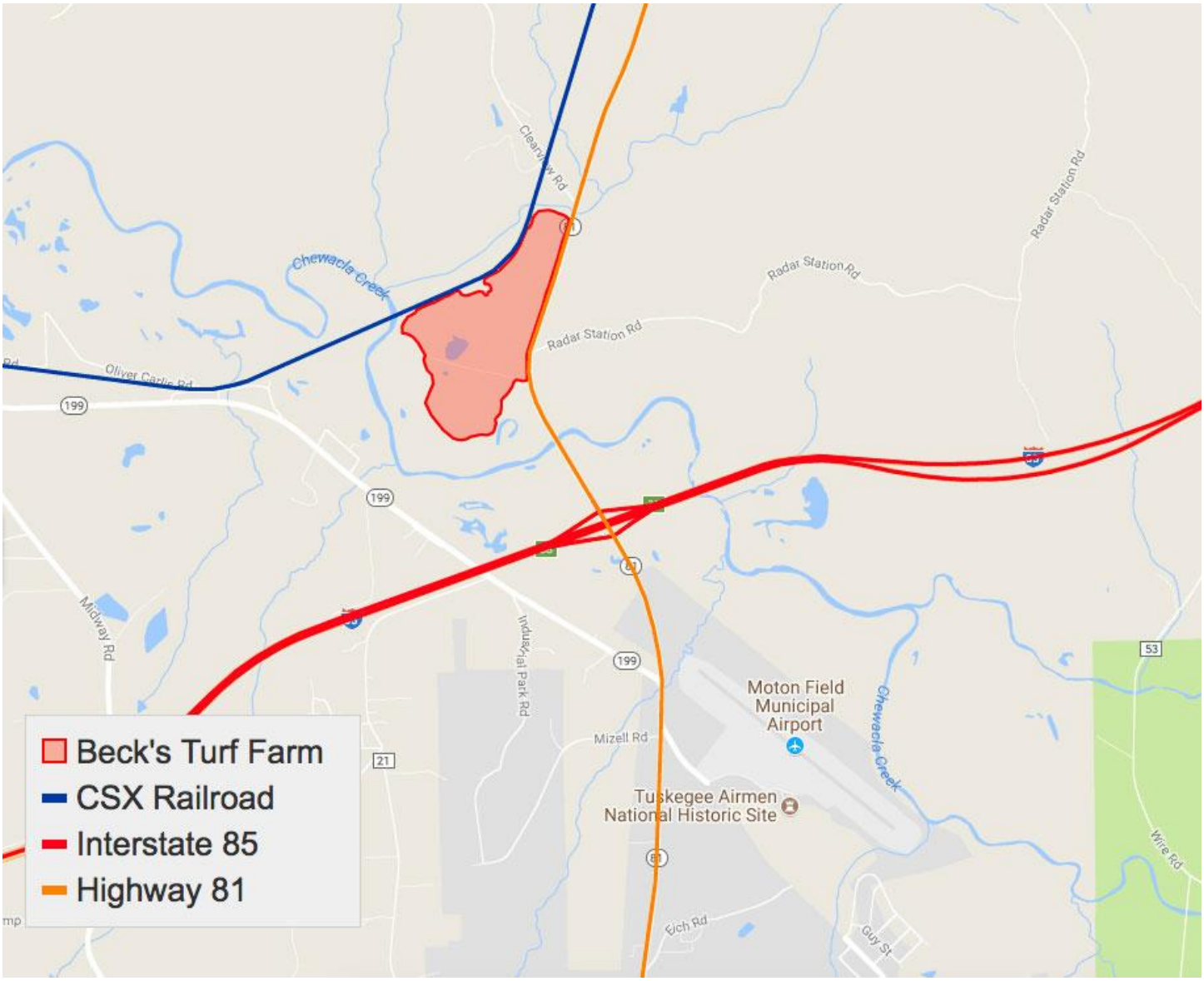
Map E-1. CSX Industrial Site Macon County, Alabama

Macon County I-85 Site
Alabama Highway 81
Tuskegee/Notasulga, Macon County, Alabama

PROPERTY DETAILS

277 available acres, shovel-ready in 2021
No zoning necessary
Adjacent to Alabama Highway 81
0.7 miles from Interstate 85
CSX mainline rail frontage
Flat topography, currently a sod farm
$25,000 per acre

Map E-2. CSX Industrial Site Macon County, Alabama



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