BDO Zone Rating: **'AA'**

Biofuel Development Opportunity Zone Risk Rating

'AA'

The North San Joaquin Valley, California Biofuel Development Opportunity Zone is rated 'AA'. There is a significant amount of underutilized nut tree biomass within the BDO Zone that can be utilized by new Bio-projects with low risk of supply and pricing.

Rating Parameters:

Category	Rated Quantity	Delivered Cost	BDO Zone Size
Orchard Biomass	898,000 gt/yr	$15-$25/gt	75-mi drive distance
Nut Tree Shells	183,000 gt/yr	$15-$25/gt	from Modesto, CA
Almond Hulls	23,000 gt/yr	$90-$140/gt	

BDO Zone Assets

- **Nearly 900,000 tons of underutilized woody biomass from orchard recycling at low risk**
- **Long-standing industry with 6,300 Nut Tree growers/suppliers in the BDO Zone**
- **Well established processors' network to separate nuts from biomass shells and hulls**
- **The majority of feedstock is available for only the cost of transportation**
- **Local demand for available residuals continues to go down, opening opportunities for new Biofuel industries**
- **Selected site for bio-project development has flexible zoning, access to natural gas, rail and near extensive highway system**

BDO Zone Liabilities

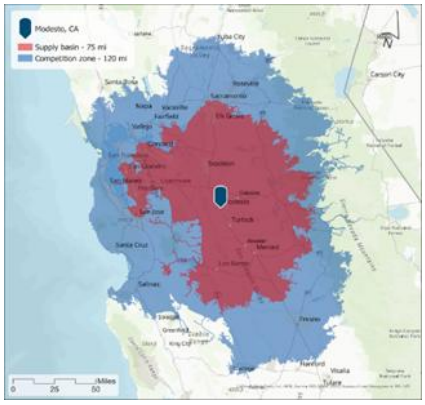
- **Challenging permitting process for new bio-economy industries in California**
- **Normal Weather Risks for Agricultural-based feedstock**
- **Higher prices of energy (natural gas, electricity and diesel) compared to the average national figures**

BDO Zone Risk Rating

The North San Joaquin Valley, CA, Biofuel Development Opportunity Zone is rated 'AA,' or 'very low' risk.

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

Modesto, CA BDO Zone



Scoring & Rating Methodology

In assessing the biomass supply chain risk for the Biofuel Development Opportunity (BDO) Zone, 72 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.

Feedstock quantities are expressed in green tons per year (gt/yr) (<10% moisture content), while feedstock costs are expressed in United States (USD) dollars. Maximum transport distance is based on a 75-mile driving distance from the center point (Modesto, CA).

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).

Next, 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.

Then, the **Gross Risk Indicator (GRI)** score is calculated as the product of the RRL and the RRI

scores. For example, if the 'Competitor Price and Price Sensitivity' is scored at a RRL of 2 and a RRI of 9, then the GRI for this risk indicator is $2 \times 9 = 18$.

If the analyst deems that a typical bio-based project could put in place economically reasonable measures or best practices that mitigate either the likelihood (RRL) or the impact (RRI), or both, then the GRI will be notched accordingly, reducing the score of the respective risk indicator.

Finally, the **Loaded RI** score for each Risk Indicator is calculated as the product of the Total Notch and the GRI score, which is the final score for that 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. The BDO Zone score for Location is ***14.79 out of 100, resulting in an 'AA' designation***.

All scoring and rationale for each Risk Indicator are provided in Appendix B.

Analyst Notes

The North San Joaquin Valley BDO Zone includes a 75-mile radius of Modesto, CA, nearly 2,800,000 acres, bordering 6 counties. This BDO Zone encompasses one of the most productive agricultural regions in the country. California's San Joaquin Valley has long been a leader in the production of fruit and nut orchards, vineyards, vegetables, and dairy products. Its Mediterranean climate of warm, wet winters, westerly winds, and calm, hot, and dry summers allow it to produce over 80% of the world's almonds and 98% of its walnuts and pistachios. The residual material (nut hulls, shells, and whole recycled trees from the orchards), is what will be focused on for this rating report.

BDO Zone Assets

There are over 1,966,000 tons of orchard biomass material estimated to be generated each year including almond hulls, almond, pistachio, and walnut shells, and recycled orchard biomass. Almond hulls, along with almond, pistachio, and walnut shells are separated from the nuts at the processing facilities and the recycled orchard biomass are the results of removing and chipping/grinding orchard trees produced at the farm.

When considering the current demand for these biomass types and the Biomass Availability Multiple (BAM) factor (which indicates the degree of redundancy in the biomass supply), we estimated that over a million tons are considered very low risk in terms of their availability for future biomass projects. The low-risk biomass available includes about 900,000 tons of orchard biomass, 183,000 tons of nut tree shells, and 23,000 tons of almond hulls.

The recycled orchard biomass, essentially chipped up nut trees, is the most prevalent material. The shells and hulls of almonds, walnuts, and pistachios make up the balance.

There is no primary use for most of this material. The biomass power plants utilize ever-shrinking volumes of woody feedstock, dairies consume almond hulls as supplemental feed, and the remaining biomass is either sequestered or utilized as bedding or road base due to the lack of established markets.

The suitability of the BDO Zone region to accommodate future biomass projects was evaluated against 68 of 72 risk indicators (due to relevancy) including material suppliers, competitors for the material, supply chain impacts, and the surrounding infrastructure.

Among these risk indicators, 22 of them were deemed to be very low to low risk (primarily supplier risks) due to a well-established network of growers, processors, and orchard contractors.

The nut growers, processing companies, and orchard contractors have a track record of long-standing operations that span decades, if not generations. This is a very low risk situation that generates residual materials.

The current competitive environment for these byproducts is deemed to be low as well. Years ago, biomass power plants consumed nearly all this agricultural biomass to produce

renewable electricity. That industry has declined to just over 20 facilities, state-wide, from a high of 75 in 2000. The ever-growing volume of this generated material is continuing to lose its primary customer. Dairies consume over 300,000 tons of almond hulls as a diet supplement to cattle. This byproduct is the only one with a consistent market and predictable price. Growers are opting for sequestering residual material into the soils of the orchards. This is being done with some of the chipped-up trees from removals, but it is an expensive operation for local growers. There are questions about its carbon-sink credentials and long-term effect on the soil.

Due to the lack of established markets for most of the generated biomass in the BDO Zone, these byproduct materials are available for the price of transportation only. This competitive environment suggests a low risk to new industries looking for secure feedstock with long-term security.

The logistics and supply chains are well-established in terms of experience with collecting, handling, processing (chipping /grinding) and transporting commercial quantities of the available biomass in the BDO Zone region. The primary risks to the existing biomass supply chain are weather-related factors. Floods, fire, heat, drought, and wind all impact agricultural-based feedstock production. While the weather in this area has had some extremes in the past, it is only rated as a moderate risk due to the well-established nature of the orchards.

BDO Zone Liabilities

We found 9 risks to be deemed medium including most of the weather-related entries. As an agricultural-based crop producing biomass, these risks are part of nature with little mitigation opportunity. The local cost of energy and housing are potential liabilities to new industries for long-term operations and staffing of personnel. The history of California's permitting system has proven to be a hurdle for many new incoming industries. Any combustion-based technology must be able to mitigate emissions and impact on the environment.

Infrastructure Profile

In terms of access to the necessary infrastructure to accommodate and support the installation and long-term operation of a commercial biomass project, this project evaluated 25 tangible risk factors, such as physical infrastructure, logistics, social influences and workforce statistics. This report has focused on the Beard Industrial District as a representative location for new bio-economy industry. Beard is located 10 miles SE of Modesto on US Highway 99, a major north/south roadway in the State. Beard consists of 2000 acres of both developed and brownfield building opportunities, with all major utilities in place. Including its own internal rail system (MET) serving the district and connecting with Union Pacific and BNSF railroads.

There is a viable workforce available to draw from within the BDO Zone, however the minimum wage is higher than most of the country ($15.50/hr.) with future escalations planned within 2 years. This central California valley has a very diverse cultural influence, extensive recreational opportunities, excellent healthcare facilities, and a well-established educational network. The area provides an attractive location for staff and management

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Figure 1: Risk Indicators (Sorted by Risk Level)

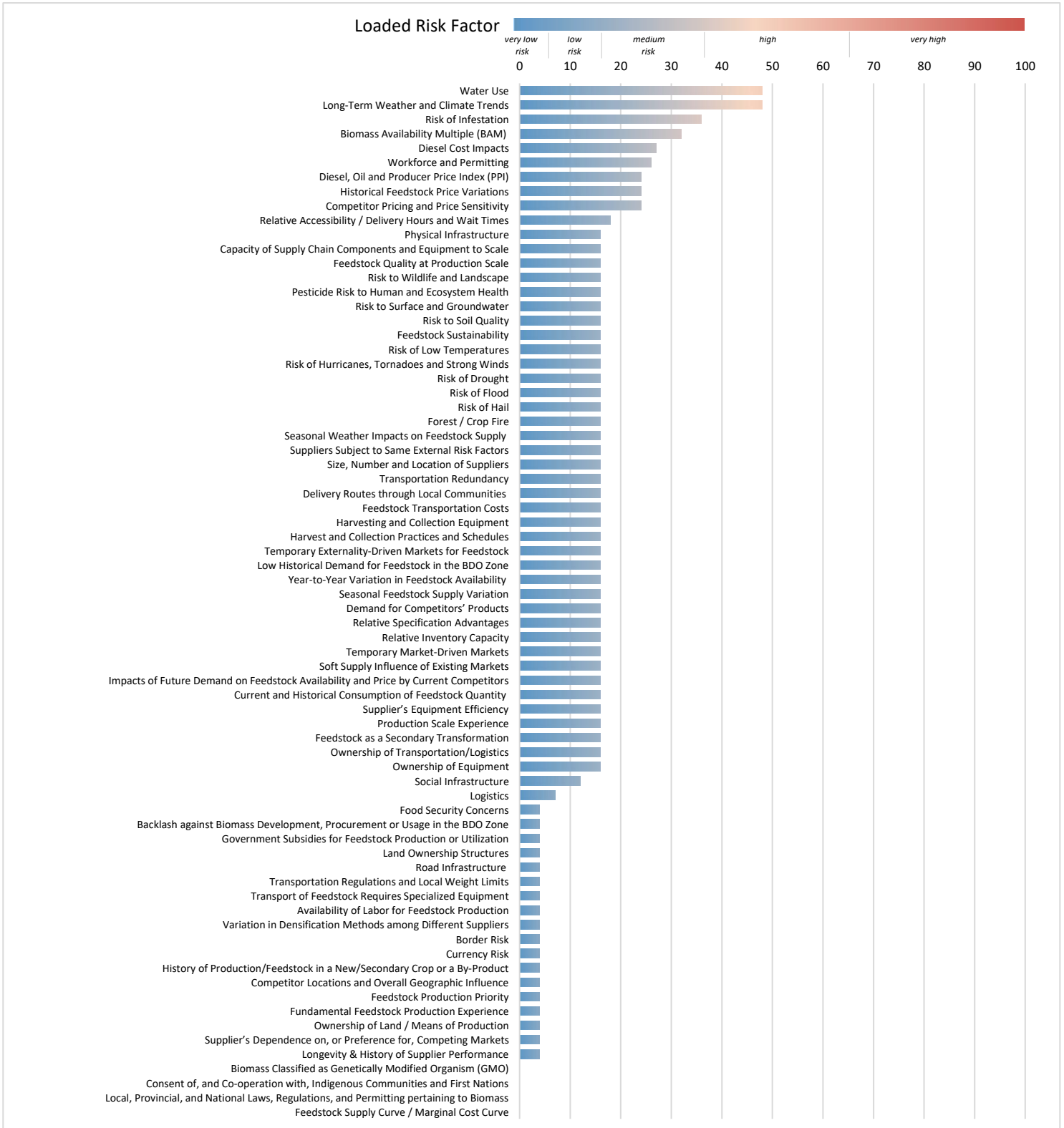


Table 1: Risk Indicators and Associated Scores

	Feedstock Supply Chain Risk Indicators	Raw Risk Likelihood	Raw Risk Impact	Gross Risk Indicator	Mitigation /Notching	Loaded RI Score
	Category 1.0: Supplier Risk					
1.1.1	Longevity & History of Supplier Performance	2	2	4	NN	4
1.2.1	Supplier's Dependence on, or Preference for, Competing Markets	2	2	4	NN	4
1.3.1	Ownership of Land / Means of Production	2	2	4	NN	4
1.3.2	Ownership of Equipment	4	4	16	NN	16
1.3.3	Ownership of Transportation/Logistics	4	4	16	NN	16
1.3.4	Feedstock as a Secondary Transformation	4	4	16	NN	16
1.4.1	Fundamental Feedstock Production Experience	2	2	4	NN	4
1.4.2	Production Scale Experience	4	4	16	NN	16
1.5.1	Supplier's Equipment Efficiency	4	4	16	NN	16
1.6.1	Feedstock Production Priority	2	2	4	NN	4
	Category 2.0: Competitor Risk					
2.1.1	Competitor Locations and Overall Geographic Influence	2	2	4	NN	4
2.1.2	Current and Historical Consumption of Feedstock Quantity	4	4	16	NN	16
2.1.3	Competitor Pricing and Price Sensitivity	6	4	24	NN	24
2.1.4	Impacts of Future Demand on Feedstock Availability and Price by Current Competitors	4	4	16	NN	16
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
2.2.1	Relative Inventory Capacity	4	4	16	NN	16
2.2.2	Relative Accessibility / Delivery Hours and Wait Times	6	6	36	50%	18
2.2.3	Relative Specification Advantages	4	4	16	NN	16
2.2.4	Demand for Competitors' Products	4	4	16	NN	16
	Category 3.0: Supply Chain Risk					
3.1.1	Biomass Availability Multiple (BAM)	4	8	32	NN	32
3.1.2	Feedstock Supply Curve / Marginal Cost Curve	NR	NR	NR	NR	NR
3.1.3	Seasonal Feedstock Supply Variation	4	4	16	NN	16
3.1.4	Year-to-Year Variation in Feedstock Availability	4	4	16	NN	16
3.2.1	Historical Feedstock Price Variations	6	4	24	NN	24
3.2.2	Low Historical Demand for Feedstock in the BDO Zone	4	4	16	NN	16
3.2.3	History of Production/Feedstock in a New/Secondary Crop or a By-Product	2	2	4	NN	4
3.3.1	Diesel, Oil and Producer Price Index (PPI)	6	4	24	NN	24
3.3.2	Currency Risk	2	2	4	NN	4
3.3.3	Border Risk	2	2	4	NN	4
3.3.4	Temporary Externality-Driven Markets for Feedstock	4	4	16	NN	16
3.4.1	Harvest and Collection Practices and Schedules	4	4	16	NN	16
3.4.2	Harvesting and 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	2	2	4	NN	4
3.5.1	Feedstock Transportation Costs	4	4	16	NN	16
3.5.2	Diesel Cost Impacts	6	6	36	25%	27
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 and Local Weight Limits	2	2	4	NN	4
3.5.6	Road Infrastructure	2	2	4	NN	4
3.5.7	Transportation Redundancy	4	4	16	NN	16
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
3.7.1	Seasonal Weather Impacts on Feedstock Supply	4	4	16	NN	16
3.7.2	Long-Term Weather and Climate Trends	6	8	48	NN	48
3.7.3	Forest / Crop Fire	4	4	16	NN	16
3.7.4	Risk of Infestation	6	6	36	NN	36
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	4	4	16	NN	16
3.7.9	Risk of Low Temperatures	4	4	16	NN	16
3.8.1	Government Subsidies for Feedstock Production or Utilization	2	2	4	NN	4
3.8.2	Local, Provincial, and National Laws, Regulations, and Permitting pertaining to Biomass	NR	NR	NR	NR	NR
3.8.3	Backlash against Biomass Development, Procurement or Usage in the BDO Zone	2	2	4	NN	4
3.8.4	Consent of, and Co-operation with, Indigenous Communities and First Nations	NR	NR	NR	NR	NR

3.8.5	Food Security Concerns	2	2	4	NN	4
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	6	8	48	NN	48
3.9.5	Pesticide Risk to Human and Ecosystem Health	4	4	16	NN	16
3.9.6	Risk to Wildlife and Landscape	4	4	16	NN	16
3.9.7	Biomass Classified as Genetically Modified Organism (GMO)	NR	NR	NR	NR	NR
	Category 4.0: Feedstock Scale-up Risk					
4.1.1	Feedstock Quality at Production Scale	4	4	16	NN	16
4.1.2	Capacity of Supply Chain Components and Equipment to Scale	4	4	16	NN	16
	Category 5.0: Infrastructure					
5.1	Physical Infrastructure	3.6	3.6	16	NN	16
5.2	Logistics	2.5	2.5	7	NN	7
5.3	Social Infrastructure	3.14	2.86	12	NN	12
5.4	Workforce and permitting	5	5.5	29	6%	26
					Average	**14.79**



North San Joaquin Valley, CA BDO Zone Independent Review Committee (IRC)

Karen Warner – CEO, BEAM Circular
Josette Lewis – Chief Scientific Officer, Almond Board of CA
Dave White – CEO, Opportunity Stanislaus
Bob Gutierrez – Executive Director, San Joaquin Partnership
David Thiel – General Manager, Cortez Growers Association
David Phippin – Partner, Travaille and Phippin
Josh Rahm – Director, California Walnut Board
Michael Karavolias – Representative, Go Biz California
Elizabeth Betancourt – Policy Advisor, CA Department of Conservation
Adam Borchard – Director, California Fresh Fruit Association
Rick Brenner – Director, ATIP
Linda Pinfold – Commissioner, Stanislaus County Ag

APPENDIX A: BIOMASS AVAILABILITY AND PRICING

The Central Valley of California, with the BDO Zone centered in Modesto, is known as one of the most productive agricultural areas in the world. It is a major hub to produce fruits, vegetables, nuts, and other food items, supplying markets both domestically and internationally.

The focus of the feedstock assessment in this BDO Zone project is on the residual byproducts of this agricultural productivity including **woody biomass from orchard recycling, almond, pistachio and walnut shells, and almond hulls**. There will only be a mention of fruit pits from peaches, apricots, and cherries. These fruit pits are available only in minimal quantities since they are mostly sold with their fruit. They will not be included in the available biomass numbers, however the volume of orchard biomass created from recycling fruit trees WILL be included in the numbers.

Bees in the BDO Zone: Honeybees play a secondary but critical role in the creation of tree nut biomass. Almond trees require bees to pollinate their blossoms each spring. Pistachio and walnut trees are pollinated by the wind. Almond orchards provide honeybees with their first natural source of food each spring. Just like almonds are a nutritious snack for us, almond pollen is very nutritious for honeybees, providing all ten of the amino acids their diets require. As the bees move from tree to tree, they pollinate almond blossoms. In fact, every almond we eat exists because a honeybee pollinated an almond blossom, so they're an essential partner for almond farmers. Without honeybees, there would quite simply be no almonds.

Extreme spring weather (wind and rain) can increase the risk of almond harvests as bees do not like inclement conditions. This risk is addressed within the risk profiles in Appendix B of this report.

BDO ZONE SUPPLY AND COMPETITION ZONES

In this assessment, the BDO Zone supply area is defined as the area from which feedstock can be economically sourced which encompasses a 75-mile driving radius around Modesto, California as the center point. This is considered the biomass supply basin. This area includes portions of six counties: Stanislaus, San Joaquin, Merced, Calaveras, Tuolumne, and Mariposa. The surrounding area (in blue, 120-mile radius) will be used in evaluating the current uses of these biomass resources by the existing competitors.

Figure A-1. The Supply Basin and Competition Zone around Modesto, CA, as center point

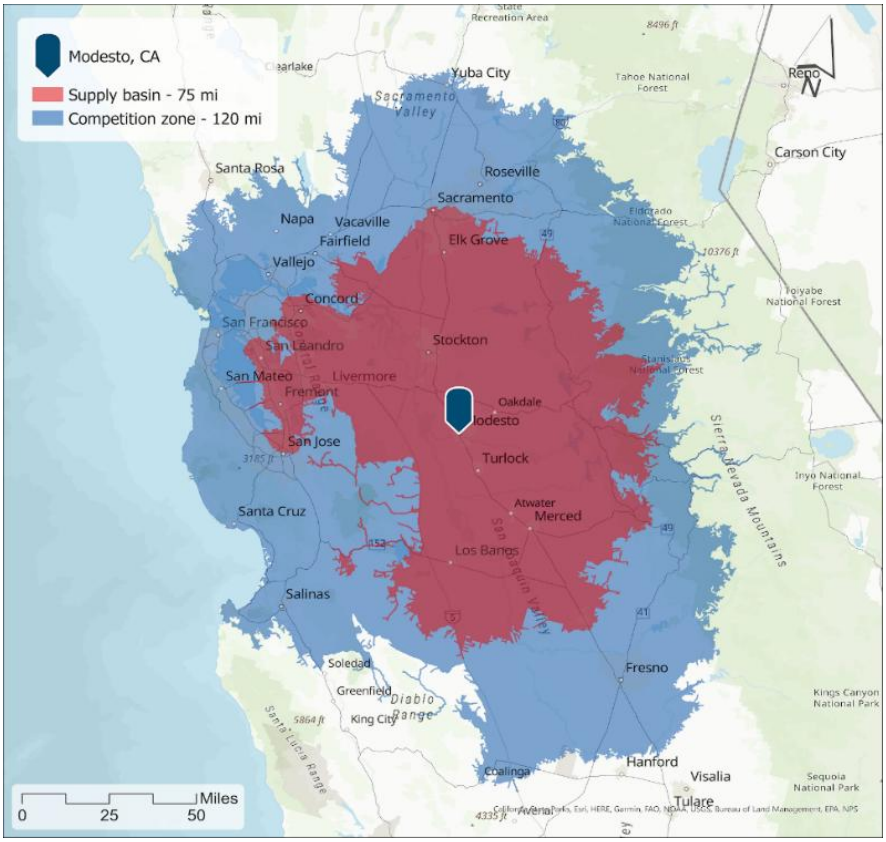
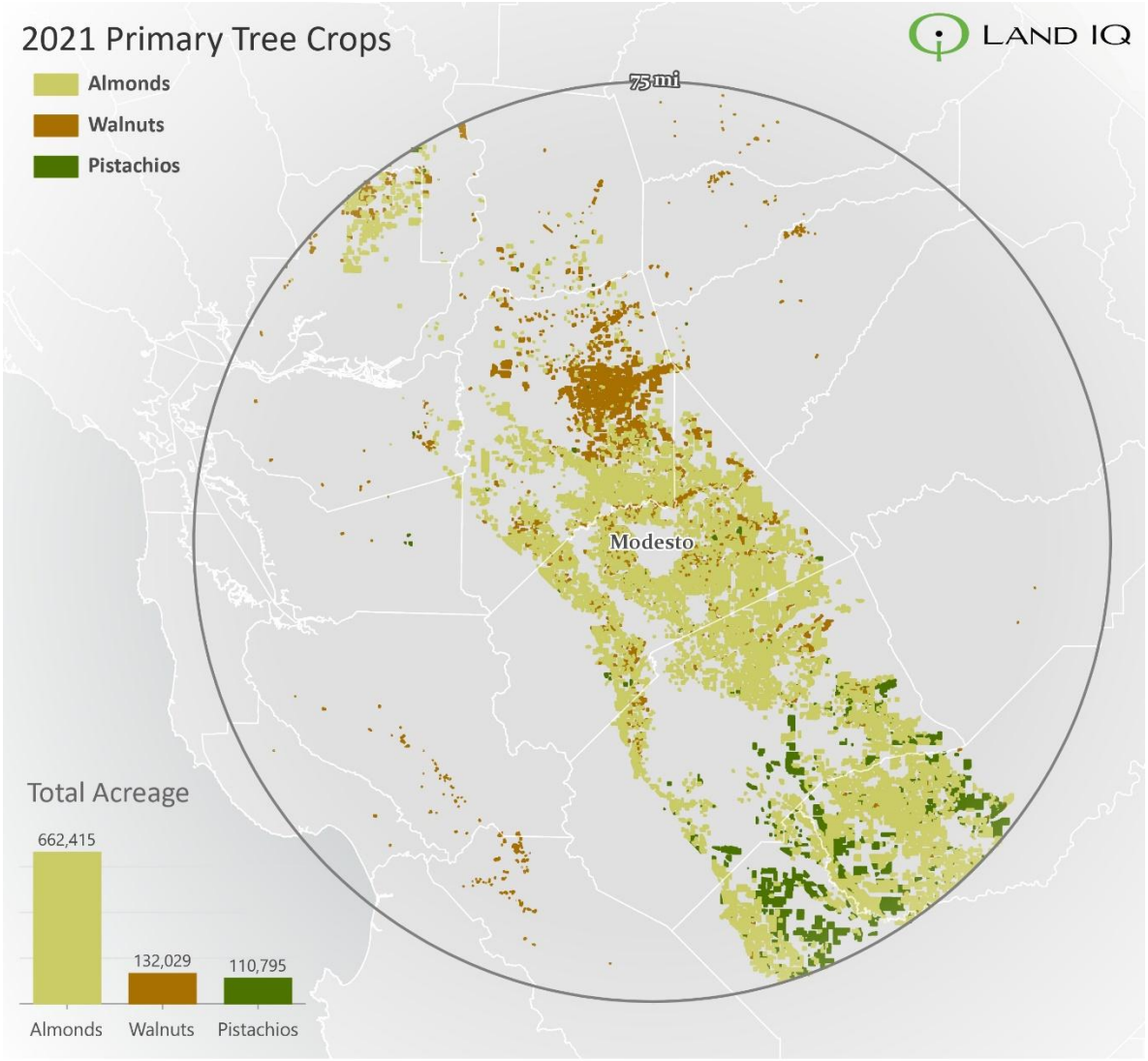


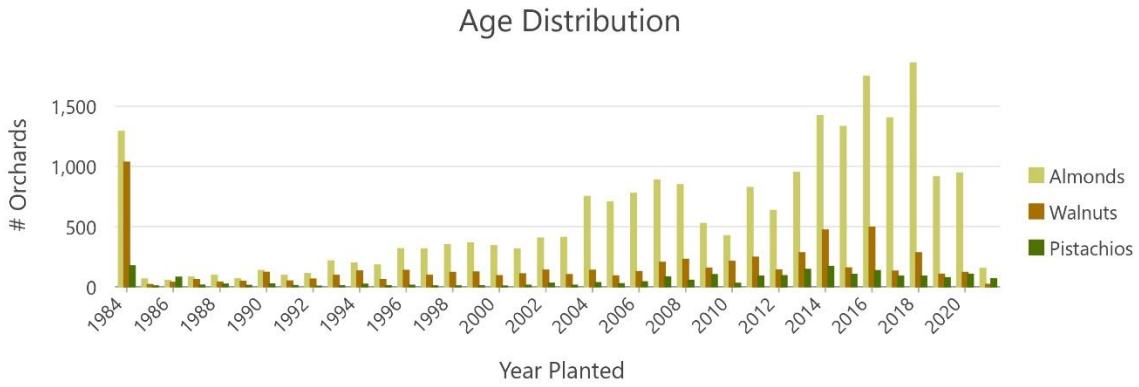
Figure A-2 below shows the bearing acreages for the three primary nut trees in the supply basin. 2021 was the most recent year of data available from Land IQ.[1] Consumer increase in demand for tree nuts over the last 20 years has resulted in a gradual increase in planted acreage. The 2021 acres shown here are used in this report to calculate the volume of biomass residuals generated in the BDO Zone rating area. 2021 is the latest data available from Land IQ.[1]

The supply basin represents just over 1,000,000 acres of actively bearing nut and fruit trees, about 48% of the State's total bearing acreage. These acreages have been gradually increasing since 1988 until about 2020 when new plantings leveled off. There has been a slight decrease in bearing acreage in the past couple of years (Figure A-2). The number of nut tree growers in the supply basin are 3500 for almonds, 2800 for walnuts, and 30 for pistachios.[2] These numbers for the BDO Zone represent about half of the total almond growers in the State (7,600) and nearly two-thirds of the total walnut growers (4,100).

[1] Land IQ is an independent data collection company specializing in California agriculture reports and assessments.
[2] Stewart Resnick and Wonderful Pistachios account for nearly 65% of pistachio production in California.

Figure A-2. Nut Tree Acreages in the BDO Zone





Types and Availability of Biomass in the Supply Zone

This rating will focus on three major forms of biomass feedstock produced within the supply zone including:

1) Orchard Recycling Woody Biomass (chipped or ground trees)

2) Almond, Pistachio, and Walnut Shells

3) Almond Hulls

As mentioned earlier, the initial rating assessment included fruit tree pits for Peaches, Apricots, and Cherries. These items are generally sold inclusive of their pits (not separated) so there are insufficient quantities of fruits pits available in the supply area as potential biomass feedstock. Thus, their volumes will not be included with the final availability numbers. However, some volumes of fruit trees themselves are recycled each year to replant or be replaced with an alternate crop. Those volumes of woody biomass will be included in the overall volume of available material.

Orchard Recycling Biomass

The first category of available biomass in this report is produced by removal of the trees themselves. This residual woody material can be chopped or ground. Nut trees typically have a "productive bearing" life cycle of between 20-30 years. After planting, these trees take 3-5 years to mature and begin bearing fruit/nuts. At the end of their cycle both their production volumes per acre and quality of the nut are reduced. Fruit trees have a slightly longer lifecycle, up to 40 years in some cases. The growers (orchard owners) may determine each year the volume or percentage of their orchard to be either replanted in the same crop, or in some other viable crops. Removing the trees requires heavy equipment such as bulldozers to push over the trees and the roots. They are left for several weeks to dry before they are ground or chipped. If soil-borne pathogens are present, this material is allowed to be burned rather than sequestered in soil or reused in other applications.

Whole Orchard Recycling involves sequestering the woody material underground in the orchard. This is a very expensive alternative for the growers. Our research shows that contractors charge between $3,000-$4,500 per acre to remove and chip the trees, spread the chips, trench the orchard to sequester the material, then smooth and laser level the land. There is a lot of discussion on whether sub-ground sequestration is effective. It is intended to reduce the emissions of methane as the material decays. Some feel it may be robbing the soil of its nitrogen, requiring supplemental applications by the grower (McDaniel et al., 2014; Steinbeiss et al., 2008).

Orchard Recycling Contractors are independent businesses hired by the orchard growers to remove nut trees that have exceeded their useful life, succumb to disease or are being replaced with another crop or nut tree variety The orchard owner must then decide if the material is to be sequestered or hauled away. The sequestering is done by spreading the chipped material then "ripping" large trenches in the soil to have them filled with the material. This process requires large tractors with fork attachments that extend several feet into the ground. Dirt is spread over the trenches to totally submerge the biomass underground. The contractor may then be asked to smooth the acreage and laser level for planting. Figure A-5 shows the location of nearly 20 recycling contractors in the BDO Zone region.

If the material is destined for a biopower facility, road-based application or other use, the contractor is responsible for having the piled wood chips hauled away. Some have their own truck fleet or will subcontract this.

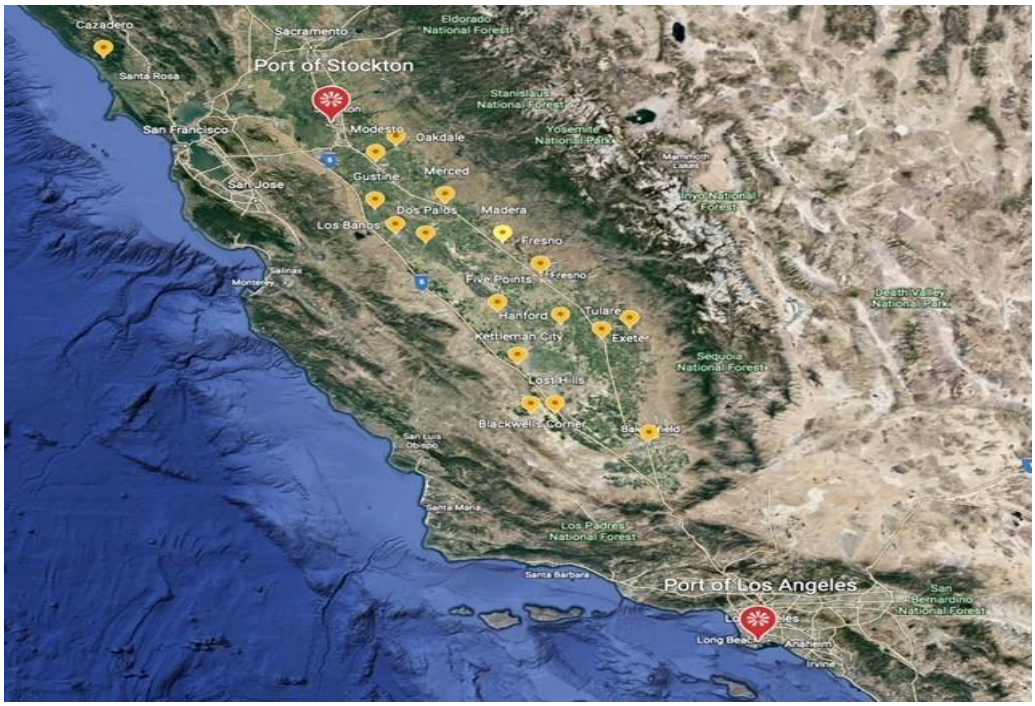
Figure A-3. Orchard trees "pushed over" for removal



Figure A-4. Chipping orchard trees into biomass



Figure A-5. Orchard recycling contractors in the BDO Zone

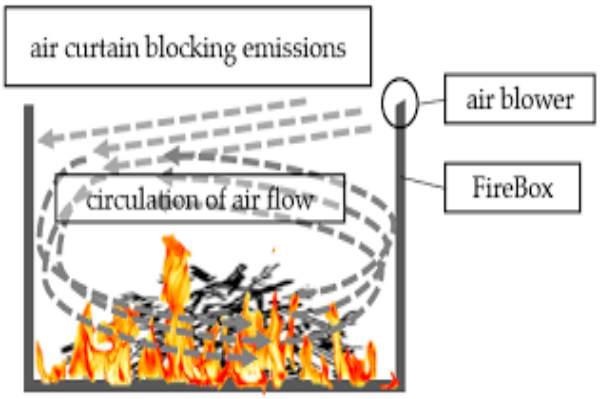


Widespread burning of this material is not allowed in California without a specially designed and permitted "**air curtain burner**" (See Figures A-6 and A-7 below). **Air Curtain Burners**, also called Air Curtain Incinerators, Fireboxes, Trench Burners, etc., were designed principally as a pollution control device for open burning. The primary objective of an air curtain machine is to reduce the particulate matter (PM), or smoke, which results from burning clean wood waste. There are a few of these coming into operation, but not enough to have an impact on the volume of excess biomass that is out there. Their purchase price tags can easily exceed $100,000.

Figure A-6. Air Curtain Burner



Figure A-7. Air Curtain Technology



Additionally, recent regulations now prohibit disposing of this type of organic material in California landfills.

There is a grant program[3] in place sponsored by the San Joaquin County Valley Air Pollution Control District that growers can apply for, which will pay them up to $1,300/acre if they sequester their orchard wood chips. This is not quite enough to offset the additional costs of burying the material, which is usually $2,000+/acre after clearing and chipping. Most of the qualifying payments end up being less than $1000/acre due to various stipulations of the grant.

As shown in Table A-1 below, the volume of material created by this orchard recycling process in the BDO Zone exceeds **1.34 million tons annually**. The projections of the Orchard Recycling acreages below are based on discussions with both growers and recyclers, historical activity, and analyst projections. It is noteworthy that walnut tree biomass is not sequestered in the soil. It exudes a chemical called juglone from its roots into the soil that is toxic to many other plants and kills them, thereby reducing competition for resources. Juglone is also leached into the soil from rainwater encountering fallen walnut leaves, branches, and decaying fruits.

Table A-1. Annual volume of woody biomass generated from orchard recycling within the Supply Basin

Orchard Removal Biomass	Total Bearing Acres	% of Bearing Acres to be Removed	Annual Acres to be Removed	Tons of Biomass Per Acre	Total Orchard Biomass Generated
Almond Orchard Biomass	662,415	10%	66,242	10	662,415
Pistachio Orchard Biomass	110,795	3%	3,324	10	33,239
Walnut Orchard Biomass	132,039	5%	6,602	90	594,176
Peach Orchard Biomass	75,000	5%	3,750	10	37,500
Cherry Orchard Biomass	30,000	5%	1,500	10	15,000
Apricot Orchard Biomass	10,000	5%	500	10	5,000
Total Tons of Orchard Biomass Generated from Orchard Recycling in the BDO Zone					**1,347,330**

[3] AG Burn Alternatives Grant Program

Almond, Pistachio, and Walnut Shells

The shells of these nut trees make up the second category of biomass feedstock for this report. We used the following industry-standard calculations in determining the annual volumes of this material available:

Almond Shell Biomass is 11% of total weight of the harvested almond crop (Figure A-8)

Pistachio Shell Biomass is 15% of total weight of the harvested pistachio crop (Figure A-9)

Walnut Shells Biomass is 67% of total weight of the harvested walnut crop (Figure A-10)

Pistachio shell volume can be deceiving. The shell makes up about 50% of the total weight of the harvested nut. However, since most pistachios are sold with their shell, we're using an industry average (15%) to determine the shell-only volume. Walnuts are generally sold without their shell. Walnut shells are very thick and heavy, and they are 67% of the total weight.

Figure A-8. Almond hulls and shells

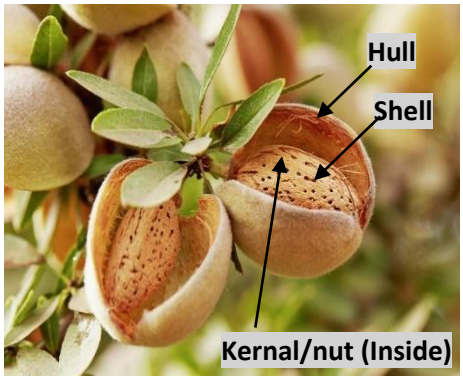


Figure A-9. Pistachio shell and nut



Figure A-10. Walnut shell and nut



As discussed before, the peach, apricot and cherry pits account for minimal quantities each year and are not included in this report.

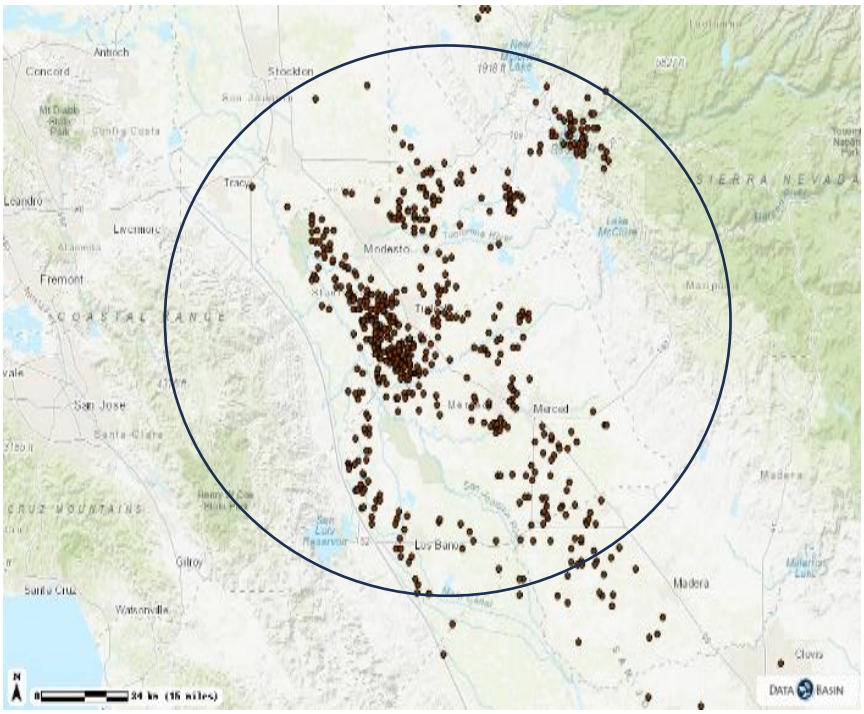
A Note on Almond Woody Biomass – The harvesting process for almonds involves mechanically shaking the tree and allowing the nuts to fall to the ground. From there, they are scooped up, placed in trucks, and headed to the processor. As part of this process, a volume of woody debris, small limbs, leaves, and even some dirt is included in what is picked up from the ground.

Historically, the processors charged the growers only by the ton of final separated almonds, leaving the processors to deal with the cleaning and disposing of this "non-almond "debris. More recently, processors have begun charging the growers by the ton of material received from the orchard growers. The incentive here is for the growers to clean out that woody debris, which can be as much as 15% of the total weight, before shipping off the non-processed almonds. The growers generally leave this woody debris on the orchard floor as a soil amendment. For the purposes of this report, this non-almond woody debris will not be included in the available biomass numbers. **In contrast, pistachios and walnuts are harvested into hoppers, and never touch the ground.**

Almond Hulls

Almonds are the predominant tree nut in the BDO Zone area with 64% of the total bearing acreage. The harvested nut consists of the shell which surrounds the nut itself and the outside hull surrounding both the shell and the nut. The almond hull is a valuable supplemental feedstock for the cattle and dairy industries due to its high level of soluble sugars. With fewer acres of alfalfa, it turns out that almond hulls make an excellent substitute for alfalfa in dairy rations. They have similar fiber content, more sugars, and less protein. Historically almond hulls have made up nearly 5% of dairy feed. Recent studies by UC Davis (Heguy, U of California Davis, 2022) have confirmed that a higher percentage of almond hulls can be fed to lactating cows with no negative effect. There are over 550 dairies within the BDO Zone, as shown in Figure A-11.

Figure A-11. Locations of dairies that consume almond hulls in the competition zone



When calculating the quantity of almond hulls produced each year in the BDO Zone area, we used: Total Acreage of bearing almond trees (Figure A-2 above) X 2000 pounds per acre production and then used 52% of that as the weight of the hulls in a harvested almond crop.

The almond hulls and shells are owned by the processing company that separates them from the nut. The grower owns the almond nuts themselves. These hulls provide a substantial revenue source each year to the processor as their value has historically been between $90-$200/bone dry ton (more details below).

The only real established demand for any of the biomass residuals in the supply basin is for almond hulls. They are sold both directly and through brokers to almost all the local dairy operations. The processors move most of their hulls via brokers who handle dozens of agricultural products. Since they are normally sold on an as-delivered basis, the brokers communicate with the processors on the most desirable end users, usually the closest to mitigate transportation costs.

As shown by Table A-2 below, we have used the Land IQ acreage amounts, USDA historical production volumes per acre, and the percentage of the biomass weight to the total nut harvesting weight to determine how much residual tree nut biomass is created each year.

Table A-2. Nut Tree Residuals - Annual Volume created within the BDO Zone

Nut Tree Residual Biomass	Total Bearing Acres*	Nut Harvest Per Acre (lbs.) **	% of Nut Harvest that is Biomass	Tons of Biomass Produced
Almond Hulls	662,415	2,000	52%	344,456
Almond Shells	662,145	2,000	11%	72,836
Pistachio Shells	110,795	3,000	15%	24,929
Walnut Shells	132,029	4,000	67%	176,919
Total Tons of Nut Tree Biomass Produced within the BDO Zone Annually				**619,140**

*Reference: Land IQ

** USDA Data: https://www.nass.usda.gov/Publications/Todays_Reports/reports/ncit0522.pdf

Note that **pistachios** are normally sold with their shell, so residual biomass is less per acre. Also, pistachio yield numbers are based on a two-year average volume per acre. Pistachios have a "high" and "low" year production cycle.

Current Demand and Pricing for Biomass Residuals in the Competition Zone

Table A-3 below shows current uses and pricing of orchard biomass resources in the competition zone. The prices represent undelivered prices to the end users. Transportation costs vary between $10-25/ton, and generally, do not exceed 50 miles from the processor or orchard lands. Some selected specialty industries may pay a little more than freight, but their requested volumes are generally very low.

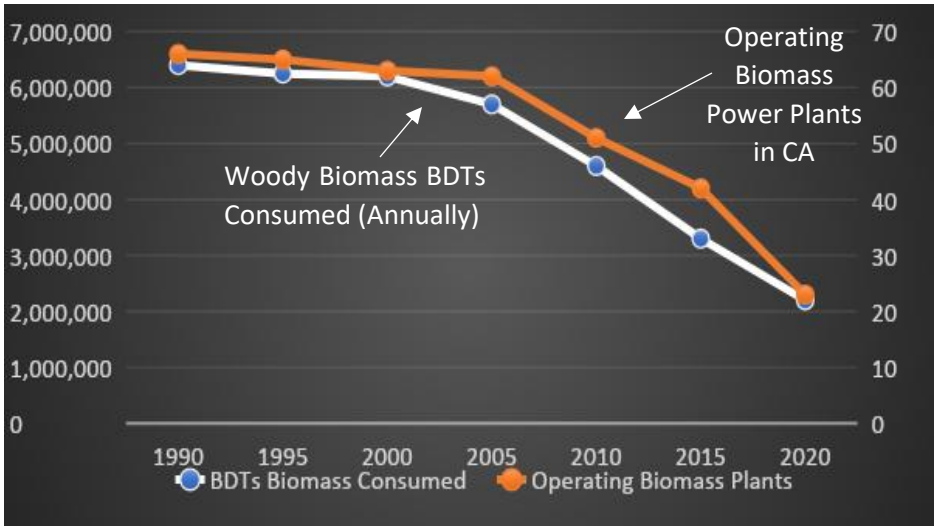
Table A-3. Available prices for nut tree residuals within the BDO Zone

Available Biomass Prices	Market Price Per Ton	Current Uses	% Available to New Industries
	US$		
Almond Hulls	90-140	Cattle Feed	5-10%
Almond Shells	15-25	Animal Bedding	40-50%
Almond Orchard Recycle Biomass	0	Power generation, Sequestration	100%
Pistachio Shells	0	Road Base, Power generation	100%
Pistachio Orchard Recycle Biomass	0	Power generation, Sequestration	100%
Walnut Shells	0	Abrasives, Cat litter	100%
Walnut Orchard Recycle Biomass	0	Power generation, Road Base	100%

The biomass items above, except for almond hulls and some almond shells, are essentially available for the price of transportation. Most almond hulls are currently being sold to dairy operations with an annual consumption of 327,110

tons/year. Byproducts such as pistachios shells, walnut shells, and the almond shells, have seen their demand and value declining over the past several years with the demise of the biomass power industry in California, as shown in Figure A-13. These combustion facilities once consumed most of these high BTU agricultural residuals while generating much needed renewable energy in the State. Within the last 15 years, however, the number of operating power plants has been greatly reducing (Figure A-13 below) due to expiring Power Purchase Agreements (PPAs), the advent of lower cost renewable power technologies (solar, wind, hydro, geothermal, and biofuels), and the air emissions permitting challenges.

Figure A-13. Number of renewable power plants and woody biomass consumed in California



Therefore, growing volumes of these byproducts are in search of new avenues of use or disposal. There are still small quantities being sent to the remaining power plants, usually only for the cost of transportation. Some material is being sequestered underground as an orchard soil amendment and some is crushed, then put down as road base. They have also been utilized in smaller volumes in specialty industries such as cosmetics, abrasives, and even cat litter. California landfills no longer take organic-based loads so many processors are scrambling for ways to remove this material with minimal expenses. Agricultural aggregators in the area end up with the remaining amounts, usually only paying for the transport cost.

In summary, all this residual tree nut material is being used or sent somewhere but is primarily underutilized. California's strict pollution rules do not allow for it to be simply piled up in the field and forgotten. Aggregators and brokers end up with most of it, usually at minimal cost. What is not consumed by the dairy and biomass power industries is either sequestered or shipped out of the BDO Zone. Processors and orchard removal contractors are anxiously seeking alternatives for this material. The opportunity here is for new industries to secure this high-quality biomass feedstock at commercial quantities and affordable prices, produce quality renewable products, and truly complete the Circular Economy in this industry.

Announced Bio-Economy Projects in the BDO Zone

Two projects have been announced in the past two years that could potentially utilize the existing biomass described here. Aemetis, Inc announced in 2021 they were developing a sustainable aviation fuel / renewable diesel facility in Riverbank (just east of Modesto). There has been no recent information provided by Aemetis publicly on this project to indicate it

has moved beyond the initial development stage. San Joaquin Renewables has announced their intent to build and operate a renewable natural gas facility in McFarland, CA (175 miles south of Modesto). This facility could require over 200,000 tons of agriculture biomass annually if it becomes operational. This project has been tied up with permitting and CEQA issues for the past 18 months and the Company is not announcing a potential ground-breaking timeline. Because these two projects are currently on hold with limited communication and no definitive future movement, their potential volumes and impact on the supply chain in this BDO Zone have not been used in this report.

Availability of Low-Risk Biomass in the Supply Basin for Future Biomass Projects

Not all the produced nut tree residuals in the supply basin will be available to future biomass projects for various reasons, such as unwillingness of suppliers to participate in the supply system, or uncertainties in the length of harvest seasons, because of flood, drought, and competition from existing end users. In addition, there are assumptions in the biomass calculation. To reflect on such uncertainties, we consider the **Biomass Availability Multiple (BAM)** in the calculation of low-risk biomass availability, which indicates the degree of redundancy in the biomass supply in the BDO Zone. The BAM is the mean ratio of biomass feedstock available to a new project, in relation to the delivered cost, divided by the new project's mean rated quantity. The BAM is a strong indicator of supply chain resilience when stressed by supply shortage and/or supplier breach.

The orchard biomass is produced in the orchard fields which are easy to access. There are over 50 biomass orchard recyclers that have established logistics to grind/chip orchard biomass and transport to the end users. In addition, nut shells and hulls are produced at processors' facilities with established logistics for delivery to the consumers. There is relatively reliable data on the number of planted trees and their yield. Thus, we use a low degree of redundancy of 1.5 as BAM, meaning that about 1/3 of total available biomass will not be available for future biomass projects. Table A-4 shows the potential availability of low-risk biomass after applying the BAM factor to the available biomass.

Table A-4. Availability of Low-Risk Biomass in the Supply Basin

Biomass Type	Potential availability of biomass after deducting the existing demand (Tons/yr)	Availability of low-risk biomass after applying BAM factor of 1.5 to the potential availability (Tons/yr)
Orchard Recycle Biomass	1,347,330	898,220
Almond, Pistachio and Walnut Shells	274,684	183,122
Almond Hulls	34,445	22,963
Total	1,656,459	**1,104,305**

Applications for Residual Nut Tree Biomass

All these nut tree residuals have various applications and potential uses in bioeconomic industries:

Biomass Energy: Organic materials such as hulls, shells, and woody biomass can be used as a feedstock for bioenergy and biofuel production. They can be converted into biogas through anaerobic digestion or used to produce heat and electricity through combustion or gasification/pyrolysis processes for transportation biofuels production. Examples include renewable diesel, sustainable aviation fuel (SAF), green hydrogen, methane, or renewable natural gas

Industrial Applications: Certain organic byproducts like these may have applications in industries such as manufacturing, construction, or bio-based materials. For instance, agricultural residues like pistachio shells can be processed into bio-based plastics, cement, building components, or fertilizers.

Composting and Soil Amendments: Materials from agricultural byproducts are rich in organic matter and can be composted to create nutrient-rich soil amendments. Biochar and compost can improve soil fertility, structure, and water retention, enhancing agricultural productivity and reducing the need for synthetic fertilizers.

Animal Feed: Obviously in use today but could be expanded to other animals like poultry and horses. Bedding materials and children's playground base are a widely used application for many of these materials. It is important to note that the utilization of these byproducts may depend on factors such as availability, quality parameters, economic viability and technological feasibility. Additionally proper handling and disposal of agricultural byproducts are crucial to prevent environmental contamination and ensure sustainable waste management practices.

APPENDIX B: RISK INDICATOR SCORING METRICS

CATEGORY 1.0: SUPPLIER RISK

1.1 Risk Factor: Creditworthiness/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: The California tree nut industry is characterized by a multitude of well-established agricultural operations. With over 11,000 growers operating within the state, a significant proportion of these entities have maintained production for extended periods, spanning multiple decades and even generations. This long-standing presence signifies stability and a deep-rooted knowledge of the industry's intricacies. The landscape further includes 95 processor firms, typically characterized by substantial size and well-established manufacturing facilities. These facilities have been in operation for numerous years, solidifying their positions within industry.

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 × RRI) is 4 out of 100.	**4**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score (Total Notch × GRI Score) is 4 out of 100.	**4**

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 to supply to specific competitors for biomass feedstock. Preferences may be due to historical, long-term, or personal relationships, less stringent feedstock quality requirements, more flexible operating hours by competing markets, or supplier's dependences 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 a competitor resulting in supply disruptions for the Issuer.

Risk Information:

Processors: The primary suppliers of biomass are the processors within the tree nut industry. These processors receive harvested nuts from growers each season and are responsible for separating nuts from hulls or shells. Growers retain ownership of the separated nuts, while processors own the residual biomass (hulls and shells).

Distribution to Aggregators: Processors typically sell approximately 95% of the generated hulls and shells to local merchandisers or aggregators. These intermediaries, in turn, supply the biomass to local dairies, power plants, and other industries for specialized applications. A smaller portion of almond hulls is directly sold by processors to their preferred dairy customers, often as part of long-term agreements.

Contractors and Growers: In the context of orchard removal residuals, contractors own the biomass created through tree removal and chipping processes. The decision regarding whether to sequester this material underground in the

orchard or sell it as feedstock rests with the grower. This flexibility allows growers to adapt to market conditions and environmental considerations.

Market Sales: The remaining biomass, if not sequestered, is either sold to biomass power facilities as feedstock or to aggregators. Importantly, these sales transactions often occur with minimal associated costs, reflecting the economic dynamics of this market.

Overall, the growers and processors do not have a vested interest in the material and the market price dictates which market it goes to. This is deemed to be low risk.

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 × RRI) is 4 out of 100.	**4**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**4**

1.3 Risk Factor: Supplier Control Over Production and Transportation

1.3.1 Ownership of Land/Means of Production

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

Risk Information: In the California tree nut industry, land ownership plays a pivotal role in assessing risk. Most growers in this sector own the land on which their orchards are situated, often representing multi-generational ownership. Additionally, processors, who are key players in the industry, also commonly own the land and facilities where their hulling and shelling operations are conducted.

Land Ownership: The fact that virtually all growers in the industry own the land beneath their orchards is a positive credit factor. Land ownership provides a sense of stability and commitment to the industry, as it signifies a long-term investment in the cultivation of tree nuts.

Generational Ownership: The presence of multi-generational growers living on their orchard acreage reinforces the industry's stability. This long-standing connection to the land suggests a deep understanding of the intricacies of the business, which can contribute positively to creditworthiness assessments.

Asset Ownership: Processors who own both land and facilities for hulling and shelling operations demonstrate a degree of control over their infrastructure. This ownership structure can positively influence credit assessments as it enhances the processor's ability to manage costs, invest in efficiency improvements, and maintain operational stability. A very favorable risk situation.

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 × RRI) is 4 out of 100.	**4**

Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **4**

1.3.2 Ownership of Equipment

Rationale: In most cases, suppliers which own or lease equipment for harvest, collection and processing feedstock are lower risk than those who 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 harvest times that are convenient 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, the use of a third-party company with standard equipment specializing in harvesting, collection and transportation may decrease quality variations (e.g., ash content) of final feedstock.

Risk Information: Many growers appear to rely on third-party contractors for harvesting, which suggests a level of financial dependency. Smaller orchard operations using older, less efficient equipment may face slightly higher risk due to potential productivity challenge.

Contractors involved in harvesting and orchard removal typically own modern equipment, indicating a degree of financial stability. Their services are in demand, and they contribute to the sustainability of the orchard operations. However, the risk may vary depending on the size and diversification of their clientele.

Processors owning their own facilities and equipment are generally considered low risk. This ownership suggests a stable financial position and a level of control over their operations. Additionally, owning assets can serve as collateral for financing, further mitigating risk.

Overall, while there are variations in risk among different entities within the nut industry supply chain, the industry appears to have relatively manageable credit risks. Growers and smaller orchard operations may need to ensure efficient resource management, while contractors and processors seem to be in a more favorable financial position, and they have the capability to supply feedstock to future biomass projects.

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 × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **16**

1.3.3 Ownership of Transportation/Logistics

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

Risk Information: Most of the larger nut processors own and operate their own trucking fleets. They utilize this equipment to both pick up raw harvested nuts from the growers and ship out resultant biomass to end users (aggregators, dairies, etc.). This is a competitive pricing advantage and offers them greater control over timing and clients. Some may only own the trailers and subcontracts to truck drivers during the harvest season.

Owning this logistics piece also allows the processors to determine how the residual biomass materials are handled. Most almond hull shipments to the merchandisers and dairies are sold at a delivered price, using the processor's trucks and trailers. Woody biomass and shell sales either directly or via aggregators, are more easily sold when transport is available from the processor's facility.

The woody orchard residuals from the trees are shipped off-site using either contractor-owned trucks or independent trucking firms. Since only a few contractors own their own trucks, this can create an issue for availability of transport. The transportation for residuals is well established and driven primarily by the Processors lowering risk.

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 × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**16**

1.3.4 Feedstock as a Secondary Transformation

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

Risks are higher if feedstock is a secondary transformation of a primary, more valuable product. It may not be economical for suppliers to produce biomass on its own, in the absence of markets for the primary product. 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 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 production of the primary crop requires resources to be taken away from the production of secondary crop (e.g., in case of shorter harvesting windows due to weather), the secondary feedstock supply will suffer. In times of stretched resources, suppliers may also perceive harvesting and collection of the feedstock as a nuisance, potentially decreasing production levels.

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

Risk Information: The nut industry's primary focus is on nut production, and the production of residual biomass is contingent upon the processing of these nuts. However, due to the long history and established market for nut production, the risk of the nut market becoming unviable is considered low.

Orchard removal biomass is a by-product of the removal of orchard trees, either due to their age or desire to plant alternative crops, and its production is intrinsically linked to this process. The risk level is primarily determined by the

demand for orchard removal and how efficiently the biomass can be processed or sequestered. While there may be some risk associated with fluctuations in the orchard removal market, it is generally considered low to moderate due to the consistent need for this by-product in various applications.

The industry's stability and track record mitigate the risk associated with the dependency on nut processing.

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 × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **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: Processors and orchard removal contractors in this industry have extensive experience and a long-standing presence, often spanning decades. Their well-established facilities and capabilities contribute to their financial stability. Since they are not directly involved in the growing or harvesting of nuts, their operations are less susceptible to the risks associated with nut production. As a result, the credit risk for these entities is considered low.

Overall, the combination of experience, stability, and limited exposure to the production aspects of the nut industry positions processors and orchard removal contractors as low risk entities.

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 × RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × 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 with the production of the quantity of feedstock required.

Risk Information: The predictability of industry scale-up based on production acreage, the planting of new acres, and the timeline for these acres to become productive is a significant advantage. Nut trees take several years to mature and

start producing nuts, providing processors with ample lead time to adjust their operations accordingly. This predictability reduces the risk associated with sudden changes in production volumes.

Orchard removal contractors are experiencing annual growth in the acreage to be removed, and this trend has been consistent for many years. Their ability to adapt and expand their operations to meet the growing demand aligns with industry growth, reducing the credit risk associated with fluctuations in removal needs.

The predictability and scalability of the nut tree biomass industry, coupled with the ability of processors and removal contractors to respond to changes in demand, contribute to a low risk assessment for this sector. The consistent trends and lead time for adjustments further mitigate potential risks.

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 × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**16**

1.5 Risk Factor: Supplier Harvesting/Collection/Processing Capacity

1.5.1 Supplier's Equipment Efficiency

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

Risk Information: Processors responsible for separating nuts and producing biomass are characterized by long-standing operations, modern equipment, and efficient processes. These factors contribute to their financial stability and competitive advantage. The utilization of modern equipment and efficient processes enhances their ability to generate revenue while managing costs, reducing credit risk.

Orchard removal contractors are well-equipped with the necessary larger equipment for tree removal and grinding/chipping operations. Their revenue is typically tied to the acreage they clear, making efficiency crucial to their profitability. While the presence of efficient equipment and the payment structure aligning with productivity are positive factors, the credit risk may vary based on their ability to maintain and upgrade equipment and adapt to changing demand for removal services.

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 × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**16**

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, or when it is a by-product or a residual from a more valuable primary product, then suppliers may not put in sufficient effort for consistent production. Risk of breach increases when production and/or delivery of feedstock compromises a supplier's ability to make a primary product.

When biomass feedstock is a by-product of another main higher margin or main product (e.g., corn stover (e.g., corn) or forest residues (e.g., pulpwood)) supply may not be a top priority for a supplier.

Risk Information: The production of by-product biomass from tree nuts is an inherent part of the nut industry, driven by the high market value of nuts and established acreage. Processors are obligated to separate nuts from hulls/shells, creating biomass residuals as a primary product. This necessity reduces the credit risk for processors, as they have no alternative but to generate biomass.

Orchard removal contractors are specifically hired to reduce removed trees into wood chips or ground woody biomass, with the sole purpose of creating manageable biomass. Their role is well-defined and aligns with industry needs. As long as there is demand for orchard removal, the risk associated with these contractors remains low.

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 × RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **4**

CATEGORY 2.0: COMPETITOR RISK

2.1 Risk Factor: Influence on Feedstock Supply of Existing Markets

2.1.1 Competitor 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 the geographical influence a competitor may have on new plants within a BDO Zone, including competitive advantages such as short hauling.

Risk Information: The five operational biomass power facilities in the BDO Zone rely on an annual intake of over 65,000 tons of nut tree biomass residuals. These materials are predominantly sourced from local orchard contractors and processors. This localized approach minimizes freight expenses, reducing the risk associated with transportation costs.

The area is characterized by a significant presence of dairy operations that utilize residual almond hulls as part of their dietary mix. With nearly 35 processors (hullers/shellers) in the vicinity, there is a consistent and reliable supply of nut residuals. The processors utilize aggregators (brokers) extensively to manage much of the material transportation to end users. This distribution aligns well with aggregator practices, as they strategically select dairy and power plant locations

near processors' facilities. This reduces transportation expenses and enhances the feasibility of achieving higher selling prices, further mitigating transportation-related risk.

Despite the existence of demands for nut tree biomass residuals in the region from power plants and dairy industry, we expect the location of these markets will not have an influence on the demand and pricing of underutilized biomass resources in the BDO Zone region as none of these markets will not likely create demand for these biomass resources in the future. In addition, the existing supply chains both by processors and aggregators have shown that they can procure feedstock for new markets as new demand arises in the region.

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 × RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **4**

2.1.2 Current and Historical Consumption of Feedstock Quantity

Rationale: Clear understanding of feedstock consumption by key competitors for each rated type of feedstock 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 to the impact of external events (e.g., weather events, structural economic changes, seasonality, or policy change).

Risk Information: Orchard removal biomass is an ever-increasing volume of material which has only limited utilization. Over 1,340,000 annual tons being generated end up being sequestered back into the orchard soils. The aggregators take a sizable portion, perhaps 50%, to be processed for ground cover, road base or shipped out of the BDO Zone. The biomass power plants take any remaining volumes at virtually no cost.

The biomass power facilities play a role in the utilization of remaining shells from almonds, pistachios and walnuts, accounting for an annual intake of 65,000 tons, which represents 25% of the total available supply. This diversified sourcing strategy somewhat mitigates the risk associated with relying solely on almond shells, but the credit risk is still present, particularly if there are disruptions in the pistachio and walnut shell supply chain.

The dairy and cattle operations within the BDO Zone exhibit a viable market for almond hulls, consuming approximately 320,000 annual tons, which accounts for 95% of the total available supply. This high degree of utilization would normally introduce a moderate credit risk due to potential volatility in almond hull availability, but the small volume of almond hulls that might be sold into a new biofuel industry is minimal. So, based on historical consumption, availability risk is low for almond hulls.

Additionally, these dairy operations consume approximately 35,000 tons of almond shells for bedding, representing 40% of that available supply.

With all existing competition, there are still commercial quantities of underutilized biomass in the supply basin for future 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 *low*, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**16**

2.1.3 Competitor Pricing and Price Sensitivity

Rationale: Understanding how much competitors pay (or receive) for different feedstock types is an essential step to determining competitiveness of Issuer and to accurate assessment of 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 ability/willingness to pay premiums for feedstock during times of feedstock shortage or reduce prices (or cut off deliveries) during gluts. Competitors that have an ability to offer higher prices for feedstock during feedstock shortages can pose significant risk to 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: The biomass derived from tree nuts, including shells and orchard removal biomass, is predominantly sold to power plants and aggregators at prices primarily covering transportation costs, ranging between $10/ton and $20/ton. Some niche industries, such as cosmetics, animal bedding, and chemicals, may offer a token price for these materials. While this low pricing regime mitigates risk to some extent by promoting steady demand, it also reflects the limited value proposition of these materials in the market.

The historical price volatility of the most valued feedstock, almond hulls, ranges from $90/ton to $200/ton. This signifies a moderate risk to any new incoming industry wishing to utilize hulls in their fuel mix. These price fluctuations are closely linked to the dynamics of the cattle industry, particularly the rising costs of alternative feeds such as alfalfa and corn. When alfalfa and corn prices rise, the demand for almond hulls as a supplement or substitute in the dairy feed mix increases, leading to higher hull prices. Conversely, when alternatives become more accessible or affordable, almond hull prices tend to decrease. The drastic price drop from near $190/ton to just under $100/ton in early 2023 highlights the inherent risk in this sector for this biomass material, driven by external factors influencing feedstock pricing.

In summary, the feedstock pricing in this context is characterized by moderate to high volatility due to the sensitivity of almond hull prices to external factors, particularly those affecting the cattle industry. However, we did not include almond hulls as part of the underutilized feedstock available for future bio-economy projects. The low pricing structure for other biomass materials, while offering some stability, may also limit potential revenue streams. Businesses operating within this sector should carefully monitor market conditions and price trends to effectively manage risk and adapt to changing economic dynamics.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed *medium*, therefore the RRL is 6 out of 10. Due to the volatility of hull market pricing.	**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 × RRI) is 24 out of 100.	**Score** **24**
Mitigation/Notching No notching necessary.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 24 out of 100.	**Score** **24**

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 can lead to higher prices, feedstock disruptions, shortages or supplier breach 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 production of renewable chemicals, for example), high interest in a supply basin 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: The residuals – shells and orchard biomass – have no consistent applications or markets currently that would be increasing demand. Future increases in demand for these products will necessarily come from outside the existing markets. Low risk to future price increases.

The demand for almond hulls in the dairy industry is currently flat. The increased price of alfalfa hay in the last couple years has helped maintain the hull pricing but has not increased the demand. The lack of growth in dairy-related production is resulting in a larger volume of almond hulls each year going unsold. This should result in a lower market price and increase the attractiveness of this material for new markets.

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 × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **16**

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 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: The competitive dynamics within the residuals market in the BDO Zone appear to have a minimal influence on credit risk. Suppliers within the area generally exhibit a willingness to efficiently move these materials without incurring significant losses, indicating a favorable operating environment.

While almond hulls play a vital role in providing substantial income to processors, their pricing is primarily linked to the availability of alternative cattle feeds. This linkage makes it challenging for any single dairy or new industry entrant to exert substantial influence on the market price of this feedstock. The presence of numerous dairy operations, nearly 50 processors, and over 30 aggregators locally underscore the competitive landscape, where pricing is fundamentally driven by broader supply and demand factors within the industry.

This low level of competitive influence suggests a relatively stable market environment with limited susceptibility to price manipulation or disruption, resulting in a favorable credit risk outlook. Businesses operating within this sector can reasonably expect a predictable pricing structure based on the area-wide supply and demand dynamics, which should support a low credit risk assessment.

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 × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × 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 (Bergtold 2018).

Risk Information: The pricing and availability of orchard biomass materials such as shells and trees have no obvious seasonality component, either for supply or relative pricing. The tree nuts are harvested seasonally (in the fall) but storage of the materials mitigates the non-harvest seasonal availability risk. The biomass power facilities accept material year-round. Sequestration is done in all months and dairies utilize hulls consistently.

Our outreach and literature review indicated that these two existing markets have been able to secure their biomass demand and with the abundance of underutilized biomass resources in the BDO Zone region, we expect the temporary markets likely will not have a significant impact on biomass supply security and pricing. Thus, the risk here is low that there would be an interruption in availability or major change in pricing for the materials.

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 × RRI) is 16 out of 100.	**16**

Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**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 competitively pressure it can exert on supply. The 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 Issuers plant (with lesser inventory capacity) may be forced to put suppliers on quota. Larger inventory capacity on the part of competing markets thereby creates supplier loyalty and can make it more difficult for new projects to secure supply without paying a significant premium.

Risk Information: Consumers of hulls, shells and orchard biomass demonstrate the ability to effectively store sizable quantities of material throughout the year. For nut production, the processing season occurs during the fall months (August - October), requiring the need for extended storage for almond, pistachio, and walnut residuals. The availability of adequate land for feedstock storage among competitors further supports the favorable risk rating.

The fact that these biomass residuals do not degrade significantly over time is a positive factor. While moisture content fluctuations may occur during storage, they have minor significance regarding the nutritional and combustion properties value of the feedstock. This stability reduces the risk of material loss and ensures a consistent supply for consumers. Biomass power plants can receive orchard biomass residuals throughout the year, as the process of chipping up removed trees is not tied to a specific season and can occur year-round. This flexibility in sourcing allows for continuous operations without significant on-site storage requirements, further contributing to a favorable credit risk profile.

The processors, contractors and dairies generally have adequate storage capacities as there is no concern with outdoor, open storage of the materials. We expect that the future biomass projects can leverage on the existing biomass supply chains and meet the biomass demand of their facilities year-round with safe and cost-efficient storage practices.

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 × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**16**

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 efficiently discharge can occur.

Risk Information: Biomass power plants present a difficult scenario. They often require specialized unloading procedures for the material, such as truck dumps or tilts, to transfer chip trailers into their receiving areas. The high volume of trucks attempting to unload can lead to substantial delays, sometimes reaching 2-4 hours at the facility. Such

delays can pose a moderate credit risk as they may result in operational inefficiencies, increased transportation costs, and potential disruptions in the supply chain.

Any new industries seeking to utilize these materials must assure deliveries times are short for arriving transport vehicles. This is a moderate risk but can be mitigated by layout of the receiving area and adjustment to operating hours.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed *medium*, therefore the RRL is 6 out of 10. The primary biomass power plants have consistent wait times.	**6**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed *medium*, therefore the RRI is 6 out of 10. The potential for extensive wait times at biomass plants.	**6**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL × RRI) is 36 out of 100.	**36**
Mitigation/Notching **RRL Mitigation (Notch)** Having a well-designed trucking area based on the daily capacity of the biomass facility and operating during primary operational hours can mitigate the waiting times for the trucks. In addition, proper on-site and off-site storage strategies can reduce the number of truckload deliveries and waiting times. Such measurements considered at the design phase can notch down the likelihood of the long waiting time. We assumed the notching to be 50%. **RRI Mitigation (Notch)** No notching for impact. The Total Notch (RRL Notch × RRI Notch) is 50%.	**Notch** **50%**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 18 out of 100.	**18**

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 limited variance in tree nut biomass quality among suppliers is a positive aspect. This consistency ensures that end-users receive materials with predictable and reliable characteristics. Such uniformity in quality reduces the risk of operational disruptions and quality-related credit issues.

The flexibility in processing orchard residual biomass, either through chipping or grinding, provides choices based on specific end-user needs. The primary difference in quality relates to moisture content, with lower moisture content offering cost advantages due to reduced trucking expenses. This adaptability allows for cost-effective transportation solutions and supports a favorable risk profile.

The dairy industry is focused on the nutritional value of the almond hulls and this orchard biomass is not the right feedstock for them. In contrast, the biomass facilities are more interested in clean, debris-free woody material (low ash content) with reasonable moisture content (10-30%). This is deemed to be low risk as final specification of the material is generalized.

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 × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **16**

2.2.4 Demand for Competitors' Products

Rationale: Increased demand for 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 dairy industry is struggling with rising costs, environmental pressures, and a quest for water. Biomass power plants close nearly every year due to high power production costs and emission pressures. Therefore, the risk is low that these the existing end users will create more demand for the underutilized biomass resources in the BDO 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 × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **16**

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: The orchard biomass is produced at the orchard fields which are easy to access. There are already over 50 biomass recyclers that have established logistics to grind/chip orchard biomass and transport to the end users. In addition, nut shells and hulls are produced at processors' sites with established logistics for delivery to the end users.

Also, there is relatively reliable data on the number of planted trees and their yield. Thus, we use a low degree of redundancy of 1.5 as BAM.
Raw Risk Likelihood (RRL) — **Score**
The risk likelihood is deemed *low*, therefore the RRL is 4 out of 10. — **4**
The likelihood of the BAM factor being way different than our estimated value (1.5) is low given the good degree of the accuracy of biomass availability and supply chain data and information we were able to collect.
Raw Risk Impact (RRI) — **Score**
The risk impact is deemed *high*, therefore the RRI is 8 out of 10. — **8**
As some of our conclusions in the biomass availability assessment are based on assumptions and the fact that feedstock redundancy, or BAM, is an important variable when assessing feedstock supply feasibility, its level can impact the supply chain significantly. So, the risk impact is deemed to be high.
Gross Risk Indicator (GRI) — **Score**
The Gross Risk Indicator (RRL × RRI) is 32 out of 100. — **32**
Mitigation/Notching — **Notch**
No mitigation necessary. — **NN**
Loaded RI Score — **Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 32 out of 100. — **32**

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 core supplier.

Risk Information: The majority of residual biomass is available for only the cost of transportation within the BDO Zone. Since there is essentially no established cost for the material itself, outside of freight costs (covered elsewhere), an expanding marginal cost curve for the base material price is not relevant here.
Raw Risk Likelihood (RRL) — **Score**
The risk likelihood is deemed *not relevant*, therefore the RRL is not rated. — **NR**
Raw Risk Impact (RRI) — **Score**
The risk impact is deemed *not relevant*, therefore the RRI is not rated. — **NR**
Gross Risk Indicator (GRI) — **Score**
The Gross Risk Indicator (RRL × RRI) is not rated. — **NR**
Mitigation/Notching — **Notch**
The Total Notch (RRL Notch × RRI Notch) is not rated. — **NR**
Loaded RI Score — **Score**
The Loaded RI Score (Total Notch × GRI Score) is not rated. — **NR**

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 (Golecha & Gan 2016) and can manifest in shortages and higher costs for Issuers.

Risk Information:

Nut Tree Biomass:

Seasonality: Harvested only in the fall, resulting in a concentrated supply of biomass during that period.

Storage and Shipping: The material is easily stored and shipped throughout the year with minimal degradation in quality. This is already being done by the aggregators and processors.

Orchard Biomass Residuals:

Seasonality: No seasonality observed for this material, as it can be generated continuously throughout the year as orchards are removed and replanted.

The absence of seasonality for orchard biomass residuals may contribute to a more stable and predictable biomass supply throughout the year. In contrast, the seasonality of tree nut biomass, while manageable due to its storage and shipping capabilities, may introduce some degree of supply variability.

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 × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **16**

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.

Risk Information: The production of nut tree biomass – hulls, shells, trees – is in direct correlation with the acreage planted and nuts produced. Appendix A details that tree nuts production has been on a gradual growth trend for the past 10 years, increasing 36% growth during that time. The risk is low as this trend is expected to continue.

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 × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **16**

3.2 Risk Factor: Historical Issues

3.2.1 Historical Feedstock Price Variations

Rationale: If volatility is shown in the historical feedstock price, 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: The pricing volatility for most nut tree biomass components has been due to the demise of the biomass power generating facilities (See Appendix A, Table A-3). Ten to fifteen years ago, agricultural biomass sold for $40-$50/ton, sometimes more when demand for it was high for making power. Now those prices have dropped to almost zero as there is an oversupply with fewer power plants available, lack of open burning options and no landfill accessibility for this material.

The pricing for almond hulls fluctuates based on the market price for alternative cattle feedstocks (alfalfa, corn, grasses) The past 5 years have seen almond hulls prices peak at over $200/ton down to $80-100/ton in recent years. This variance could be weather-related, dairy need fluctuations or market demand driven by oversupply. This volatility makes future pricing a moderate risk evaluation for future tree nut biomass users.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed *medium*, therefore the RRL is 6 out of 10. Based on historical fluctuations in price of the residual biomass.	**6**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed *low*, therefore the RRI is 4 out of 10. There are commercial quantities of underutilized biomass resources in the BDO Zone region, reducing the risk of high price volatility for these biomass resources.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL × RRI) is 24 out of 100.	**24**
Mitigation/Notching	**Notch**
No mitigation necessary.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 24 out of 100.	**24**

3.2.2 Low Historical Demand for Feedstock in the BDO Zone

Rationale: If Issuer BDO Zone does not have history of developed, large-scale feedstock procurement, suppliers may not have sufficient expertise in feedstock production to ensure reliable supply, especially in 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 of pulpwood and manage log debarking and chipping internally. Rather than requiring inexperienced suppliers to deliver debarked wood chips.

Risk Information: There is lengthy historical demand for shell and tree residuals to the biomass power plants and almond hull residuals to the dairy industry. The processors, contractors, and users have been operating for decades or longer. More recently, demand for the power plants has greatly decreased as many have closed. The dairy industry is on a flat growth curve so demand for hulls and shells is static. However, since the supply chain continues to be well established this is a low-risk concern for the underutilized feedstock resources such as orchard biomass.

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 × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **16**

3.2.3 History of Production/Feedstock in a New/Secondary Crop or a Byproduct

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 growers of tree nuts are well established**,** and many have been for generations. They have utilized local, experienced processors during this time to separate the nuts from the residual biomass. The contractors have been recycling orchards for decades. There are no new feedstocks being created. This is a low-risk feedstock situation.

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 × RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **4**

3.3 Risk Factor: Non-Weather Based Externalities

3.3.1 Consumer and Producer Price Index (CPI and PPI)

Rationale: Consumer Price Index (CPI) and PPI can impact feedstock cost of harvest and collection over time. Sensitivities to worst case scenarios should be run.

Risk Information: Outside influences such as product and consumer prices will affect the biomass logistics operations and their associated costs such as the cost of labor, equipment parts and administration. As shown in Figure C-3, CPI has shown a downward trend in the last two years, but the risk is deemed to be medium given the fluctuation in CPI causing the fluctuation in the biomass logistics costs. See Table C-16.

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

With the historical fluctuation in the CPI and PPI, the likelihood of this risk is deemed to be medium.	
Raw Risk Impact (RRI) The risk impact is deemed *low* as it does not usually impact the delivered price significantly, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL × RRI) is 24 out of 100.	**Score** **24**
Mitigation/Notching No mitigation necessary.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 24 out of 100.	**Score** **24**

3.3.2 Currency Risk

Rationale: Where feedstock is purchased in a currency different than that which a new bio-based plant with 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: No currency risks. The orchard residuals are too low in value to ship overseas. Very Low risk of dealing with different currencies.	
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 × RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **4**

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: Biomass residuals are not shipped far enough to reach an international border (e.g., Canada or Mexico). The cost of freight would easily exceed the value of the material being shipped.	
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 × RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**

Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**4**

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 (Bergtold 2018).

Risk Information: The almond hull market is closely tied to the other dairy feedstock markets, but these are not temporary markets. There have not been direct temporary external markets for the other orchard residuals currently.

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 × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**16**

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 risk 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 annual fall harvest schedule for tree nuts (Aug-Oct) is not considered either a rainy or windy time of year. These outside influences do not likely affect the quantity and quality of the resulting biomass feedstock.

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 × RRI) is 16 out of 100.	**16**

Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × 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. Use of 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 harvesting of tree nuts is done by mechanically shaking the tree(s). This equipment is common, easily available, and repairable locally (See Appendix A Figure A-5). The processors utilize common makes and models of equipment to separate the nuts from the shells and hulls. There are no unique or different ways of accomplishing this. The orchard recycling contractors utilize standard bulldozers and tub grinders or chippers to process the removed trees.

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 × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × 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 (Huhnke 2018).

Risk Information: The feedstocks involved here consist of wood chips (from orchard removals) and hulls and shells from the nut tree processing. There are no existing requirements of specifications of how this material is to be prepared for outbound shipment from the processors.

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 × RRI) is 4 out of 100.	**4**

Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × 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. 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 Issuer's for whom large feedstock requirements, or development of new (or expanded) supply chains, demand significant additions to the local labor force.

Risk Information: This industry does not rely heavily on seasonal labor for production as with many agricultural crops. Often, the grower will perform the harvesting and collection and rely on the processors for transportation. This growing labor force is generally on-board full time to maintain the orchard during non-harvest periods. Our outreach indicated that there is no perceived labor shortage.

The processors are in operation year-round storing, packaging, and shipping both the nuts and the residuals to end users. They may add temporary staff in the form of truck drivers during harvest season. However, the nuts and residual biomass is not highly susceptible to spoilage or weather degradation, so delivery timing is not critical and can be stretched out if there is a shortage of drivers, assuming there are spaces available to store the materials.

The orchard recycling contractors operate all year with a consistent and full-time labor force.

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 × RRI) is 4 out of 100.	**4**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**4**

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 average transport distance from suppliers to Issuer is high, the supply chain is subject to greater sensitivities to risks, such as increases in diesel cost, weather impacts, mechanical breakdown, and by 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: The average transport distance for the residuals here is minimized by both processors and end users being closely located. Within the BDO Zone, there are over 200 orchards, 30 processors, and close to 1000 dairy

operations spread throughout the BDO Zone area taking delivery of almond shells. Additionally, there are 5 biomass power facilities within a 50-mile radius that take biomass residuals for power production. Together, these provide a consistently short trucking distance for both raw harvest material and biomass residuals resulting from processing. With the abundance of underutilized biomass in the BDO Zone, we expect future biomass plants to able to optimize their logistics network to minimize transportation cost.

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 × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**16**

3.5.2 Diesel Cost Impacts

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

Risk Information: Current diesel prices in California's Central Valley are $5.05-$5.45 per gallon for the summer of 2023. There are trends both ways, but that average range has been stable for almost a year. The base price of diesel fuel in California is generally higher than other parts of the country due to taxes. This would imply a higher risk rating due to its effect on transport costs. However, most of these materials are sold with only a transportation component in the final cost, reducing their sensitivity to the diesel price compared to other woody biomass types that end users must pay for the cost of chipping/grinding operations. Although fluctuations in diesel prices will affect the delivered price to new industries, the risk is deemed to be moderate.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed *medium*, therefore the RRL is 6 out of 10. Due to the higher price of diesel in California compared to other regions.	**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 × RRI) is 36 out of 100.	**36**
Mitigation/Notching *RRL Mitigation (Notch)* No mitigation necessary. ***RRI Mitigation (Notch)*** Given the large availability of underutilized biomass in the supply basin, the future biomass project can try to meet its biomass demand in a small supply basin, reducing the transportation distances and as a result the fuel consumption. Thus, the impact can be notched by 25%. The Total Notch (RRL Notch × RRI Notch) is 25%.	**Notch** **25%**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 27 out of 100.	**27**

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 in required transportation equipment, equipment owners have increased leverage over transportation prices and supply chain resiliency can be lower.

Risk Information: The transportation of raw (harvested) tree nuts and orchard biomass does not require specialized trucks or trailers. The same is true for the resultant residual biomass. Walking floor trailers are the most ideal when unloading without a truck lift is needed. These type trailers are the most common in the study area. Most biomass power plants have truck/trailer hoists (tippers) in place and can handle "possum belly" trailers as well. Top loading trailers can haul up to 25 tons and are plentiful in the area.

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 × RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **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 power to force regulations regarding truck transport, impeding the ability BDO Zone suppliers to transport feedstock.

Risk Information: Most of the orchards and processors are not situated in heavily populated area where local traffic is an issue. The road systems in Central California are well established and allow for high volumes of truck traffic without involving residential, school zones and high pedestrian areas.

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 × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **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 limit of local transport weights in California is 20,000 lbs. per axel and 80,000 lbs. total vehicle weight. This is a standard limitation throughout the State and across the county and does not inhibit feedstock movement in commercial quantities.	
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 × RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **4**

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: The road system around Modesto is well-maintained, especially the primary thoroughfares. Surely there are more remote areas that use dirt road access but even these are generally maintained to assure easy travel. These transport areas are considered urban.	
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 × RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **4**

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: The residual biomass transportation infrastructure is well developed and long standing. Should new industries enter the area needing biomass transportation, the existing network of trucks and trailers are not burdened, they would just have different destinations within the BDO Zone of the residual material. Rather than trucking it for fuel to biomass plants, or to aggregators for bedding and road base, the trucks would be delivering to the new facilities in the area. Risk is considered low on new industries affecting the existing biomass transportation network.	
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)	**Score**
The Gross Risk Indicator (RRL × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed low, so no mitigation is required**.**	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**16**

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: There are over 30 processors for tree nuts in the study area in addition to 6,300 growers. The 15-20 contractors who specialize in recycling orchards are based in the BDO Zone as well. This is a very heavy concentration of potential suppliers of residual biomass. These operations provide a very consistent and non-volatile supply of feedstock to the market.

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 × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × 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: There is a very low risk of a single event that could impact on the large number of suppliers in the area. Severe weather (i.e., hurricane, tornado, etc.) is very unlikely but would only push back the timing of completing harvest and processing. Even in the event of a flood, the trees are resilient and generally just absorb the water. There is no history of a single event that impacted the entire production of nuts in the BDO Zone region.

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 × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × 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 significant impact on 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 are much higher in the US where >90% of the land is private, and thus stumpage cost is determined on a competitive auction basis. Conversely, in Canada >90% of the land is owned by the Crown and stumpage is allocated by the government.

Risk Information: Most growers own their own land/orchards. They are not subject to government intervention that could disrupt their ability to produce the nuts and therefore the associated residual biomass. This private ownership reduces the risks associated with production.

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 × RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × 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 basin. Such estimates are important in assessing feedstock risk and enable accurate assessment of the efficacy of Issuer's mitigation methods.

Risk Information: The general climate and lack of severe weather impacts in the study are the primary reasons such a high percentage of world-wide nut crops are grown here. The Mediterranean climate distinguished by warm, wet winters

under prevailing westerly winds and calm, hot, dry summers provide the ideal combination for these crops. The fall harvest season is normally mild with low winds and minimal rainfall. This minimizes the seasonal weather impact on biomass production.

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 × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed low, no mitigation	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**16**

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: Long term weather and climate trends are the largest impact on total acreage of nut & fruit crops because of existing regulations on groundwater pumping (Sustainable Groundwater Management Act, or SGMA). Since this is somewhat unpredictable, this becomes a medium to medium-high risk to future developments

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 *high*, therefore the RRI is 8 out of 10.	**8**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL × RRI) is 48 out of 100.	**48**
Mitigation/Notching	**Notch**
Risk is deemed medium but no mitigation (weather risk)	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 48 out of 100.	**48**

3.7.3 Forest/Crop Fire

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

Fire-prone conditions are predicted to increase across Canada. 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 at investigating adaptation strategies and options to deal with future fire occurrence. There is growing consensus that as wildfire activity increases, fire agency suppression efforts will be increasingly strained. However, analyses of fire history suggest that it is the effect of climate variability on precipitation regimes that is the primary reason for the decreasing fire activity in the southern BDO Zone of Canada.

Risk Information: Fire is always a crop risk, but relatively low for this area. The orchards are generally lower risk because of their inherent layout of trees being spaced apart. Unlike a dense forest, an orchard fire is generally contained by not allowing the fire to transfer among the trees.

There tends to be a buildup of woody biomass (leaves, twigs) on the orchard floor. This creates a higher fire risk than barren land. However, some orchards incorporate some sort of sprinkler irrigation for the trees. This can mitigate pending fire hazard, lowering the risk of catastrophic fire damage. The risk of fire is higher if the orchard utilizes a form of drip irrigation around the base of the trees. If a top spray system is in place, the ability to protect the trees from fire is greatly increased and the risk is minimized.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed *low*, therefore the RRL is 4 out of 10. In nature there is always some risk of fire with any agricultural crop.	**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 × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
No mitigation necessary.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**16**

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: Nut trees are as susceptible to infestation as most other types of crops. Their relatively large size in comparison only means that it takes a larger insect or parasite load before significant symptoms are noticed. This risk can be mitigated through healthy orchard maintenance practices and chemical prevention. The most common invaders are navel orangeworms, flathead borers, aphids and phytophthora (a mold), and are generally treated (i.e. sprayed) annually as a precautionary measure. Dust from roads can increase the presence of mites and should be constantly reduced where possible. Lack of these prevention efforts can greatly impact nut and biomass production. These factors represent a moderate risk when projecting the generation of residual biomass from orchards

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed *medium*, therefore the RRL is 6 out of 10. Insects represent a risk to nut production and therefore biomass creation.	**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 × RRI) is 36 out of 100.	**36**

Mitigation/Notching	**Notch**
No mitigation necessary.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 36 out of 100.	**36**

3.7.5 Risk of Hail

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

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 increase.

Risk Information: Although uncommon in this part of California, hail is unpredictable and can have a dramatic effect on nut tree production if it is widespread and occurs in any regularity. Historically, there has been a low occurrence of hail, but the risk is always there.

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. If hail does occur, it can devastate the trees and dramatically affect biomass production.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
No mitigation necessary.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × 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: Weather patterns are becoming more and more unpredictable in the West. 2022 brought an unprecedented volume of rain to California and induced floods in many agricultural areas. Orchards are somewhat resilient to floods as the moisture merely soaks into the soil and most water becomes runoff. Extreme rain can have a devastating impact if the acreage is low-lying and builds up to tree-limb level. The risk level is deemed to be moderate based on recent history of unusually heavy rainfall. Minor flooding in some orchards occurred during 2022-2023 due to excessive rain on the West Coast. Most recovered well with little impact on the production of tree nuts. The risk is low as with most weather-related risks.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed *low*, therefore the RRL is 4 out of 10. Weather-related risks are difficult to predict so scoring in moderate.	**4**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed *low*, therefore the RRI is 4 out of 10.	**4**

Due to the unpredictable nature of the weather.	
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
No mitigation necessary.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × 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. Parts of Western Canada are experiencing more frequent and severe droughts, and scientists expect drought to affect new areas across Canada going forward.

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: Climatic drought conditions can affect tree nuts if it is prolonged. Most orchards are watered either through sprinkler or flood methods if natural rain is not consistent. Water expenses and availability become an issue if drought is extended over many seasons. The quality of the fruit and the amount of production are primary results of extended dry periods. This is a weather-related risk but has minimal risk to the orchard biomass production from 20–30-year-old orchard trees, the primary available feedstock in the Report.

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 × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
No notching on weather-related risks.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × 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 area is generally well shielded from hurricanes and tornadoes. Historically the inland location has been somewhat impacted by occasional high winds (El Nino) that can damage limbs and fruit. This is a low impact risk. High winds during the pollination season, early spring, will reduce the number of bees that will fly to pollinate the crops. This can have a direct effect on fruit / nut production. As a weather-related risk that could impact the production of residual biomass, the risk here is low to moderate.

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. If this weather event happens, it could dramatically affect biomass production.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching No notching for weather-related risks.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **16**

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 blooming season for tree nuts, early spring, is sensitive to low temperatures. The primary reason is the pollination required by bees. If the temperature is less than 45 degrees, the bees will not fly**,** and this results in reduced pollination and crop volumes. This still remains a low risk for the orchard removal biomass volumes

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 × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching No notching for weather-related risks.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × 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 though government programs can pose greater long-term risk than feedstock that is not. Subsidies may be subject to amendment or repeal, sometimes with minimal notice. *NOTE: This risk indicator refers to direct feedstock subsides only; it does not apply to government subsidies that pertain indirectly to the operations of the Issuer such as Loan Guarantees or to the markets for products produced by the Issuer.*
Risk Information: The tree nut industry in California, as a rule, is not subject to government subsidies. There is a regional grant available from the San Joaquin County Valley Air Pollution Control District for sequestering recycled orchard

biomass underground which pays only about a quarter of the grower's costs. The risk of governmental subsidies affecting the biomass residual market is minimal.	
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 × RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **4**

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 utilization of biomass requires specific permits (i.e., 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) then likelihood of obtaining such permits and/or complying with permitting requirements should be examined.

Risk Information: This risk is not applicable to the tree nut industry in California.

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

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: This industry supports thousands of jobs, businesses, and markets and has not experienced any public backlash to date for continued production of the residual biomass and a portion of produced biomass has been used by the power plants in the region.

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 × RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **4**

3.8.4 Consent of, and Co-operation 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 co-operation with, Indigenous communities and First Nations decreases Issuer risk.

Risk Information: Not Applicable.

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

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, 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: Tree nuts are a food source to the region and country. These nuts in the supply zone are not considered a source of residual biomass. No risk of public backlash is for their production and the resulting production of residual biomass and not possible argument of food versus fuels.

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 × RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **4**

3.9 Risk Factor: Sustainability and Environmental Concern

3.9.1 Feedstock Sustainability

Rationale: Public concerns about 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.

Canada leads all countries with 166 million hectares of certified forests, a figure that is nearly four times more than second place United States at 47 million hectares.

Risk Information: California has over 2,000,000 acres of tree nut production and the recycled tree woody biomass will continue to be produced as existing orchards age past their productive lifespan and need to be replanted. There are no concerns toward the use of the produced biomass from the orchard fields as their use do not impact the nut production and use for bio-based products and no risk of land use change as nuts are high-value product of orchard farming.

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 × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **16**

3.9.2 Risk to Soil Quality

Rationale: Soil sustainability can be defined as 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 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 which can degrade the soil and its nutrients.

Risk Information: The removal of the harvested nuts and their subsequent transportation to the processors does not impact soil quality of the orchards. The removal of nut trees (orchard recycling) can impact the soil quality only if this material is sequestered underground. The premise is this 'burying" of organic material is intended to increase the amount of nutrients in the soil. This has been shown to be effective in most applications. The risk of negatively impacting the ongoing quality of the orchard soils is deemed to be low under these circumstances.

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 × RRI) is 16 out of 100.	**Score** **16**

Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × 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: The removal of biomass from the orchards does not pose a risk to excessive nutrient runoff and groundwater as these types of biomasses are not common to be used as soil amendment.

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 × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × 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: Tree nuts are notoriously high users of water. It takes over a gallon of water to produce a single almond, 5 gallons to produce a walnut. Orchards in California consume nearly 15% of the State's irrigation water. During drought years this can become a major issue to allocate water to these verses' other crops. This presents a moderate risk to the production of residual biomass from tree nuts. Existing regulations on groundwater pumping (SGMA) also raises the risk impact factor to medium-high

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 *high*, therefore the RRI is 8 out of 10.	**8**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL × RRI) is 48 out of 100.	**48**
Mitigation/Notching	**Notch**
No mitigation necessary.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 48 out of 100.	**48**

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: Tree nuts are typically sprayed with pesticides following processing. Those risks apply themselves to the consumption of the fruit/nut but do not affect the residual biomass material.

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 × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **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: There has been no adverse effect caused to either local wildlife or landscape by the production of residual biomass from tree nut harvest. This is low risk.

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 × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **16**

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: Not Applicable.

Raw Risk Likelihood (RRL) The risk likelihood is deemed *not relevant*, therefore the RRL is not rated.	**Score** **NR**
Raw Risk Impact (RRI) The risk impact is deemed *not relevant*, therefore the RRI is not rated.	**Score** **NR**

Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL × RRI) is not rated.	**Score** **NR**
Mitigation/Notching The Total Notch (RRL Notch × RRI Notch) is not rated.	**Notch** **NR**
Loaded RI Score The Loaded RI Score (Total Notch × GRI Score) is not rated.	**Score** **NR**

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: Residual biomass is created as tree nuts are processed (separated from the nut). This biomass is indeed a secondary line of business, but it cannot be avoided during harvest and processing operations. For orchard recycling contractors to complete their projects, they have to grind/chip the trees and either remove them from the site or sequester the material. Any scale-up in acreage volume will result in a corresponding increase in volume of orchard biomass.

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 × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × 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 infrastructure in place to produce both orchard biomass (contractors) and nut hulls and shells (processors) has been firmly in place for many years. Scale up would not create risk concerns in the short-term and the existing aggregators and processors have been able to handle commercial quantities of these materials in the BDO Zone region.

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)	**Score**
The Gross Risk Indicator (RRL × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**16**

CATEGORY 5.0: INFRASTRUCTURE RISKS

5.1 Risk Factor: Physical Infrastructure

5.1.1 Land Parcel

Risk Information: The Beard Industrial District within the BDO Zone Risk Rating Area has been selected as the focus for assessing specific risks related to biofuel-based project development. The Beard Industrial District is centrally located in the BDO Zone, just 10 miles south and east of Modesto and consists of over 2,000 acres of commercial and industrial properties. This District is served by primary highways 99, 132, and Interstate 5, in addition to two railroads (BNSF and UP). This industrial park presents class A industrial and manufacturing facilities, along with prime building sites ready for development in land sizes of up to 200+ acres including all available surrounding lots. Appendix D provides detailed infrastructure details on Beard Industrial District.

Note: the BDO Zone area extends 75 miles in all directions, encompassing numerous site opportunities with similar characteristics in terms of infrastructure, buildability, costs, and development appeal that may be of interest to biofuel-based project developers. The Beard Industrial District was chosen primarily for its central location, access to primary highways/rail and its established utility network.

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 × RRI) is 4 out of 100.	**4**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**4**

5.1.2 City Ownership

Risk Information: The land and development sites within the Beard Industrial District are owned by the Beard Land Company. They offer a range of lease terms only and options to accommodate various levels of development and industrial operations. This provides flexibility for businesses in choosing the most suitable arrangement for their specific needs. If a new industry must have land ownership rather than a long-term lease, this becomes a moderate risk item.

In addition to the options available within the Beard Industrial District, other land options within the BDO Zone may have similar characteristics or alternative ownership structures. Exploring these options can be done through engaging with local real estate agents who are familiar with the area. Real estate agents can provide valuable insights into the availability of land for purchase or lease/purchase, as well as discuss specific terms and conditions associated with different properties.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed *medium*, therefore the RRL is 6 out of 10. Risk is medium due to lease-only option on land parcels within Beard Industrial District.	**6**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed *medium*, therefore the RRI is 6 out of 10. Impact on a future project that needs/wants to own its development land.	**6**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL × RRI) is 36 out of 100.	**36**
Mitigation/Notching	**Notch**
No mitigation necessary.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 36 out of 100.	**36**

5.1.3 Industrial Land Use Zone

Risk Information: The Beard Industrial District exhibits a favorable environment for business development due to its dual commercial and industrial zoning. This zoning flexibility presents diverse opportunities for businesses. The standard timeline for application review and ruling is within a reasonable range of 30-60 days, enhancing operational agility.

Furthermore, the inclusion of the Beard Industrial District in a designated California Opportunity Zone under the Tax Cuts and Jobs Act of 2017 is a notable advantage. The tax incentives associated with Opportunity Zones can yield substantial financial benefits, amplifying the district's appeal to potential investors and industry entrants. However, it is prudent for businesses to seek guidance from tax professionals to maximize the advantages offered by this designation.

In summary, the combination of zoning flexibility, efficient zone changes processes, transparent hazardous material approval, and Opportunity Zone status make the Beard Industrial District an attractive destination for the establishment of new industries within the biofuel sector. Nonetheless, some potential risks and uncertainties may affect the overall credit rating.

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 × RRI) is 4 out of 100.	**4**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**4**

5.1.4 Natural Gas Line

Risk Information: Within the BDO Zone area, natural gas pipelines and access are indeed prevalent. Pacific Gas & Electric (PG&E) serves as the primary supplier and owner of the service lines in the region. In the Beard Industrial District specifically, there is extensive availability of natural gas services.

The Beard district benefits from both small 4" feeder lines and large 16" trunk lines, ensuring efficient distribution of natural gas. The existing infrastructure supports gas pressures of up to 100 psi, enabling adequate supply for industrial users in the area.

For industrial users, the connection fees in the Beard district typically range from $100 to $750 per account based on pipe diameter. There may be additional costs for special metering, non-standard pressures or additional piping required.

It is worth noting that the industrial gas rate in the area was approximately $15.00 per thousand cubic feet (MCF) as of May 2023. This rate was considerably higher compared to neighboring areas due to reduced storage and increased demand during a colder-than-normal winter and spring season. However, it is expected that the rate will soften and align with more regional levels, ranging from $5.25 to $6.50 per cubic foot per minute (CFM).

It is important for businesses considering operations in the Beard Industrial District to factor in the natural gas rates when assessing operational costs. The expected rate adjustment to a more regional level by mid-summer indicates a positive trend that may enhance the overall competitiveness of the district by mid-summer.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed *medium*, therefore the RRL is 6 out of 10. The unpredictable fluctuation of gas storage and delivery when weather challenges are present. This makes for moderate risk for new industrial users.	**6**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed *medium*, therefore the RRI is 6 out of 10. The varying history of gas prices could impact new industries relying on gas for fuel.	**6**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL × RRI) is 36 out of 100.	**36**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 36 out of 100.	**36**

5.1.5 Electrical

Risk Information: Central California, including the Beard Industrial District, is well-supplied by power from Pacific Gas & Electric (PG&E). The region is served by PG&E's 115 KV and 238 KV transmission lines, which carry both renewable and natural gas-produced energy. This ensures a reliable power supply for businesses in the area.

The average cost of industrial power in and around the Modesto area is approximately $10.09 per kilowatt-hour (KWh). While slightly lower than the state-wide average, it is higher than the national average of around $7.15 per KWh. Businesses should consider these power costs when evaluating their operational expenses in the region.

The Renewable Portfolio Standard for California requires utilities to procure a certain percentage of retail sales from renewable resources. By 2020, utilities were required to achieve 33 percent of retail sales from renewable sources, and the goal is to increase it to 60 percent by 2030. Additionally, California has committed to achieving 100 percent clean energy by 2045.

The latest data from the California Energy Commission (CEC) shows that in 2021 more than 37 percent of the state's electricity came from Renewables Portfolio Standard (RPS)-eligible sources such as solar and wind, an increase of 2.7 percent compared to 2020.

It is evident that California is making significant progress in transitioning to renewable energy sources to meet its clean energy goals. Businesses in the Modesto area can benefit from the region's reliable power supply, including a mix of renewable and natural gas-produced energy, as well as the state's commitment to increasing renewable energy.

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 × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**16**

5.1.6 Fresh Water Supply

Risk Information: The Modesto Irrigation District supplies potable water to most areas surrounding Modesto. The water source is the Tuolumne River, which originates in the Sierra Nevada Mountains. The water undergoes a state-of-the-art treatment process at the Modesto Reservoir plant to ensure it meets or exceeds all state and federal drinking water standards.

Groundwater refers to water found beneath the Earth's surface in saturated rock formations. It is a crucial and valuable water supply, particularly in the Central Valley of California. Many cities in the region, including Modesto, have historically relied 100% on groundwater for their drinking water supply. Groundwater represents a significant component of the overall water supply in the region.

Water availability in California can vary significantly due to alternating periods of abundance and drought. In recent years, there has been a mix of feast and famine when it comes to water availability. However, it is encouraging to note that many Valley reservoirs have remained full through the summer months, and storage capacity has been enhanced to retain a larger percentage of the year's runoff.

It is important for businesses considering operations in the Modesto area to assess the current water availability and consider the potential impacts of water supply variations. It is advisable to work closely with local water authorities, such as the Modesto Irrigation District, to understand any water restrictions, conservation measures, or long-term planning initiatives in place to ensure sustainable water management.

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 × RRI) is 36 out of 100.	**36**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 36 out of 100.	**36**

5.1.7 Sewage Disposal Trunk Line

Risk Information: The City and County of Modesto manages all aspects of waste disposal for the district area. The industrial rate flow charge is $3,739/million gallons with an additional charge of $519/1000 lbs. of total dissolved solids. Primary hookups are in place with new applications being accepted by neighboring treatment facilities which have available capacity. The City of Modesto owns and operates two wastewater treatment facilities: Sutter and Jennings. Modesto's wastewater is treated to meet the stringent Federal and State regulatory requirements.

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 × RRI) is 4 out of 100.	**4**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch**)** × GRI Score) is 4 out of 100.	**4**

5.1.8 Drainage and Stormwater Management

Risk Information: The Modesto Irrigation District holds a general stormwater permit from the City of Modesto. The district sits above the San Joaquin River and is not in a flood plain.

The City of Modesto's Municipal Stormwater Permit requires that Priority New Development and Significant Redevelopment projects integrate Low Impact Development (LID) strategies and use a combination of Stormwater Volume Retention and Treatment Control Measures to retain and treat the first half-inch post-project Stormwater runoff volume for the purpose of 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 × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**16**

5.1.9 Available ICT (Information & Communication Technology) Services

Risk Information: AT&T and CenturyLink are the primary providers of internet and communications both in the district and in the BDO Zone area. Their pricing is competitive, and both can supply up to 5G speed in most areas of the Central Valley.

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 × RRI) is 4 out of 100.	**4**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**4**

5.1.10 Infrastructure – Landfill/Alternative Markets for Waste Disposal

Risk Information: Gilton Landfill is within 5 miles of the district. Standard rates of $60/ton with a minimum of $40 for most residential and industrial loads. Hazardous materials require review and a minimum of $250 fee.

There are six major landfills surrounding Modesto operated by Waste Management, the city of Modesto and Stanislaus County.

California organic waste regulations (SB 1383) went into effect Jan. 1, 2022. Among other things, the state regulation requires residents and businesses to recycle their organic waste – meaning things like food waste, yard waste, paper, and cardboard.

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 × RRI) is 4 out of 100.	**4**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**4**

5.2 Risk Factor: Logistics

5.2.1 Road and Highway Access and Intersection

Risk Information: Central California is well-served by two primary highways, US 99 (known as the "Golden State Highway") and Interstate 5. Both are primary north-south access roads between Sacramento and Fresno. Going east and west through the BDO Zone area are highways 120, 132, and 140, connecting to Silicon Valley and the Bay Area, and scenic destinations such as Yosemite and Lake Tahoe. Beard District is immediately off US 99 just south of Modesto.

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 × RRI) is 4 out of 100.	**4**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**4**

5.2.2 Ocean/River Access

Risk Information: The Port of Stockton is located just north of the study area and serves as an important transportation hub in California. As an inland port, it provides access to deep-water portage and freight transportation to the Pacific coast through the San Francisco Bay.

The Port of Stockton is known for its deepwater shipping channel, which enables the handling of large vessels and facilitates the transportation of various types of cargo. It specializes in handling both dry and liquid bulk cargo, which includes goods such as grains, petroleum products, chemicals, and construction.

Furthermore, the Port of Stockton has been designated as Foreign Trade Zone (FTZ) 231. Foreign Trade Zones are areas within the United States where imported goods can be stored, handled, and processed without being subject to customs duties. This designation provides special advantages for both imports and exports, making the port an attractive option for businesses engaged in international trade.

Overall, the Port of Stockton plays a crucial role in facilitating the movement of goods between the Central Valley region and the Pacific coast, offering a range of services and advantages for businesses involved in import and export activities.

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 × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **16**

5.2.3 Railway Service

Risk Information: Union Pacific and BNSF are both major freight carriers that provide primary freight service through Modesto. Union Pacific operates rail lines to points north of Modesto as well as to Los Angeles in the south. Similarly, BNSF serves as a primary freight carrier to destinations north of Modesto and to Los Angeles in the south.

In addition to Union Pacific and BNSF, Modesto is also served by the Modesto and Empire Traction Company (M&ET). M&ET is a short-line railroad that operates within the 2,000-acre Beard Industrial District. While its main line is only 5 miles long, M&ET maintains an additional 48.7 miles of track within the industrial corridor.

M&ET plays a crucial role in providing rail shipping services to numerous customers within the Beard Industrial District. It has the capability to offer rail transportation to destinations across the continental United States, as well as Canada and Mexico. M&ET achieves this through daily interchanges with both BNSF Railway and Union Pacific, enabling efficient connections to the broader rail network.

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 × RRI) is 4 out of 100.	**Score** **4**

Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **4**

5.2.4 Accessibility to Airport

Risk Information: Stockton Municipal Airport, located just north of Modesto, offers limited commercial airline services through Allegiant and United. This provides convenient options for travelers in the area.

Within a two-hour drive, there are two major international airports: Sacramento International Airport and San Francisco International Airport. These airports offer a wide range of domestic and international flights, providing additional options for travelers.

In the BDO Zone region, there are also several executive and regional airports catering to specific needs. One such airport is Modesto Executive, which is located within the Beard Industrial District. Modesto Executive primarily serves private and corporate jet travel, offering facilities and services tailored to those requirements.

Overall, the presence of these airports provides a range of options for commercial, private, corporate, and freight movement within the region creating low risk to new incoming industries.

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 × RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **4**

5.3 Risk Factor: Social Infrastructure

5.3.1 Healthcare Facilities

Risk Information: There are four full-service hospitals in the Modesto area including Kaiser Permanente Modesto Medical Hospital and Memorial Medical Center containing over 500 beds. Additionally, there are dozens of specialty clinics, emergency care facilities, and medical laboratories. The California Department of Health Care Services provides support and programs for the public throughout the State.

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 × RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**

Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**4**

5.3.2 Educational Facilities

Risk Information: The BDO Zone has three community colleges, a California State University extension and a University of California annex in Merced In addition, there are 25 public school districts within the region and 2 community colleges. Within the Central Valley more than a million students attend public schools.

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 × RRI) is 4 out of 100.	**4**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**4**

5.3.3 Transportation Facilities

Risk Information: The Modesto area is served locally by Stanislaus County Transportation for bus service. Alternative methods of transportation for the area includes Amtrak, Dial-A-Ride, Greyhound Bus and Modesto Area Express. Local taxi, Uber and LYFT services are also available throughout the Modesto area. This is a critical risk factor for serving employees when transportation in needed for work. This risk is deemed low as this is due to transport availability.

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 × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**16**

5.3.4 Recreational Facilities

Risk Information: Modesto and the surrounding area indeed offer a wide range of recreational opportunities for the public to enjoy. From parks and water sports to theaters, racetracks, and golf courses, there are activities to suit various interests and preferences.

For baseball enthusiasts, the Modesto Nuts, a single-A minor league baseball team, provide an opportunity to watch live games. As an affiliate of the Seattle Mariners, they offer an exciting baseball experience for fans in the area. Additionally, the Stockton Ports, an AAA affiliate of the Oakland Athletics, are located nearby, providing another option for watching professional baseball at a higher level.

In general, the BDO Zone area is well-populated with recreational diversions of all levels, ensuring that residents and visitors have plenty of options for entertainment and leisure. These recreational opportunities contribute to the vibrant and active lifestyle in the area, enhancing the quality of life for residents and attracting visitors who seek diverse leisure activities.

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 × RRI) is 4 out of 100.	**4**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**4**

5.3.5 Cultural Facilities

Risk Information: The diverse population in the Modesto area, with a nearly equal split between white and Hispanic residents, contributes to a rich cultural tapestry and a vibrant community.

With such a diverse demographic, it's not surprising that there is a wide mix of cultural activities, fairs, expositions, and specialty events to attend. These events provide an opportunity for residents and visitors to celebrate and appreciate the diverse traditions, arts, and cuisines of different cultures represented in the area.

Additionally, the agricultural heritage of the region is often celebrated through agricultural festivals that take place nearly every weekend. These festivals highlight the importance of agriculture in the local economy and provide a platform to showcase the region's agricultural products, such as fruits, vegetables, and other farm goods.

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 × RRI) is 4 out of 100.	**4**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**4**

5.3.6 Public Safety Facilities

Risk Information: The presence of County Sheriff's and local police departments in the region ensures public safety and protection for the residents. These law enforcement agencies work to maintain peace, enforce laws, and respond to emergencies within their jurisdictions.

In addition to the law enforcement agencies, the study area benefits from the services of more than two dozen emergency responder companies. These companies include various emergency response agencies such as fire

departments, ambulance services, and other emergency medical service providers. Their presence is crucial in ensuring prompt and effective response to emergencies, accidents, and other critical situations.	
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 × RRI) is 4 out of 100.	**Score** **4**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **4**

5.3.7 Housing

Risk Information: The fact that the cost of housing in Stanislaus County is 16% lower than the California average makes it a relatively more affordable area within the state. However, it's important to note that it is still 18% higher than the national average.	
Raw Risk Likelihood (RRL) The risk likelihood is deemed *high*, therefore the RRL is 8 out of 10. Increased risk due to higher housing costs.	**Score** **8**
Raw Risk Impact (RRI) The risk impact is deemed *medium*, therefore the RRI is 6 out of 10. Could impact securing the required workforce for operating future biomass facilities.	**Score** **6**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL × RRI) is 48 out of 100.	**Score** **48**
Mitigation/Notching No mitigation necessary.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 48 out of 100.	**Score** **48**

5.4 Risk Factor: Workforce and Permitting

5.4.1 Labor Availability

Risk Information: Businesses in the Central California study area are poised to benefit from several advantageous factors. Firstly, they can take advantage of the State's most affordable wage rates, which can contribute to cost savings and competitiveness. Additionally, the region boasts a large skilled labor pool, thanks to the ongoing population growth in California, particularly in Central California. The growing population creates a diverse and qualified employment pool with a wide range of qualifications, offering businesses a variety of talent to choose from.

Furthermore, Central California provides ample job training and placement services, which can support businesses in finding the right talent and ensuring their workforce is equipped with the necessary skills. This can lead to improved productivity and efficiency within the business operations.

Employees in Central California enjoy the benefits of a desirable lifestyle, including somewhat affordable housing options, a mild climate, short commutes, abundant recreational opportunities, and stunning natural scenery. These

quality-of-life factors contribute to employee satisfaction and can serve as attractive incentives for attracting and retaining talent.

Notably, more than half of Central California's residents own a home, which is a higher rate compared to larger metropolitan areas in the state where homeownership rates range from 20% to 35%. This can be advantageous for businesses in terms of employee stability and community engagement.

Overall, in the Study area California offers a favorable environment for businesses, with affordable wage rates, a skilled labor pool, and various amenities that contribute to a high quality of life for employees. These factors can enhance the attractiveness and success of businesses operating in the region.

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 × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching Risk is deemed very low, so no mitigation is required.	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **16**

5.4.2 Labor Cost

Risk Information: As of now, the minimum wage in California is $15.50 per hour for all employers. However, there are proposed changes in the minimum wage that may come into effect in the future.

If the measure passes in next year's election, there is a possibility that the minimum wage will increase to $16 immediately for businesses with less than 25 workers. This change would take effect in January 2024. Following that, if approved, the minimum wage would further rise to $17 soon and then to $18 in January 2025.

It's important to note that changes to minimum wage rates often involve legislative processes and may be subject to amendments or revisions before being implemented. Businesses should stay updated with the latest regulations and comply with the minimum wage requirements set by the state of California**.**

The minimum wage adjustments aim to improve the income of workers and address cost of living considerations. It's essential for businesses to plan and adjust their budgets accordingly to comply with the changing minimum wage requirements and ensure fair compensation for their employees.

Raw Risk Likelihood (RRL) The risk likelihood is deemed *medium*, therefore the RRL is 6 out of 10. Minimum wage is higher than most of the County. A moderate but known risk.	**Score** **6**
Raw Risk Impact (RRI) The risk impact is deemed *medium*, therefore the RRI is 6 out of 10. Proposals are to continue increasing the minimum wage for the next three years, moderate to high risk for new employers and industries.	**Score** **6**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL × RRI) is 36 out of 100.	**Score** **36**
Mitigation/Notching No mitigation necessary as labor rates are established by the State.	**Notch** **NN**

Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 36 out of 100.	**36**

5.4.3 Training Programs/Community College

Risk Information: Most of the counties in the study area have workforce training programs in place. These programs play a crucial role in developing and enhancing the skills of the local workforce, making them more competitive and better equipped to meet the needs of employers in the region.

The California Central Valley Economic Development Corporation (CCVEDC) is actively involved in partnering with workforce entities in the region. By collaborating with these entities, CCVEDC aims to promote the Central Valley workforce, technology trade programs, and educational facilities. This partnership is aimed at boosting the effectiveness of workforce training programs and ensuring they align with the needs of employers in the region.

The presence of trade schools like Stellar Career College, UEI College, and RSI, as well as Modesto Junior College, indicates that the area recognizes the importance of providing educational opportunities for various career paths. By offering specialized training in fields like refrigeration certification, these institutions help individuals develop the skills and knowledge required for specific Industries.

Moreover, the Stanislaus County Office of Education plays a crucial role in facilitating access to State and Federal programs for local and immigrant workers. By providing support and resources, they contribute to the development of a diverse and skilled workforce in the area. This type of assistance is essential for individuals seeking to enhance their job prospects and contribute to the local economy.

Overall, the availability of educational opportunities, trade schools, and supportive programs in the area significantly enhances the attractiveness of the workforce. It ensures that the local job market has access to skilled workers who are well-prepared to meet industry demands. This mutually beneficial relationship between education and the job market helps foster economic growth and development in 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 × RRI) is 16 out of 100.	**16**
Mitigation/Notching	**Notch**
Risk is deemed very low, so no mitigation is required.	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**16**

5.4.4 Permit Process

Risk Information: The permitting process in California exhibits a moderate credit risk profile. While routine building permits for structures or facilities tend to follow a relatively straightforward timeline of 60-90 days, operational, emissions, and waste disposal permitting requirements pose a significantly higher level of risk. These complex permits often entail a prolonged approval period, typically spanning a minimum of one year and potentially extending beyond. This extended timeframe elevates the credit risk associated with obtaining final construction and operational clearance in the state.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed *medium*, therefore the RRL is 6 out of 10. Most new industries will require operation and emissions permitting, this can be a lengthy process, delaying the operation of the project. This is a moderate risk.	**6**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed *high*, therefore the RRI is 8 out of 10. Any unexpected delay in the permit process will have a significant impact on the success of the future biomass projects to be up and running with minimum economic hurdles at the planning and commissioning of the project.	**8**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL × RRI) is 48 out of 100.	**48**
Mitigation/Notching *RRL Mitigation (Notch)* New industries with limited emissions and environmental impact would have shorter permitting timelines. Notched by 25%. *RRI Mitigation (Notch)* No mitigation necessary. The Total Notch (RRL Notch × RRI Notch) is 25%.	**Notch** **25%**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 36 out of 100.	**36**

APPENDIX C: TABLES, FIGURES AND MAPS

Figure C-1. Rail and Air Transportation Network in the BDO Zone

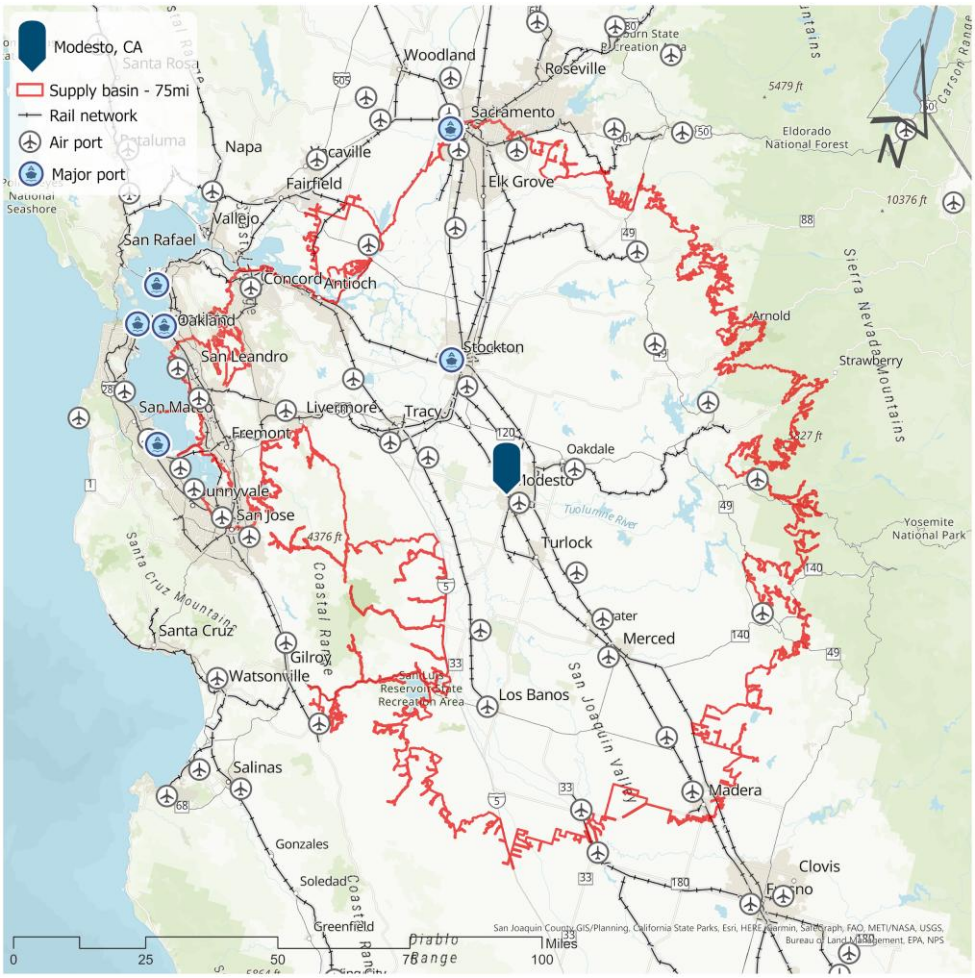


Figure C-2. Road and Highway Network in the BDO Zone

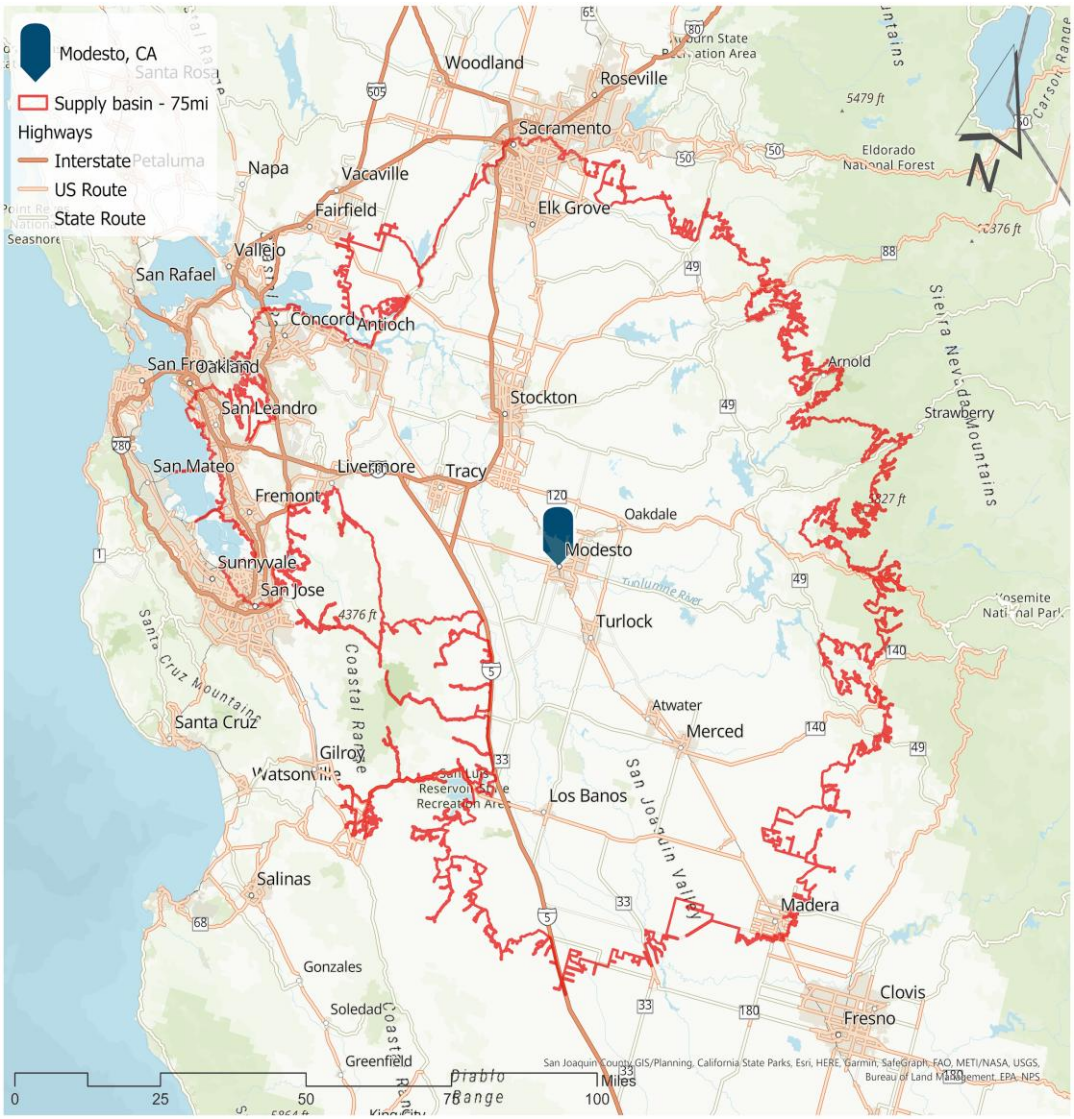
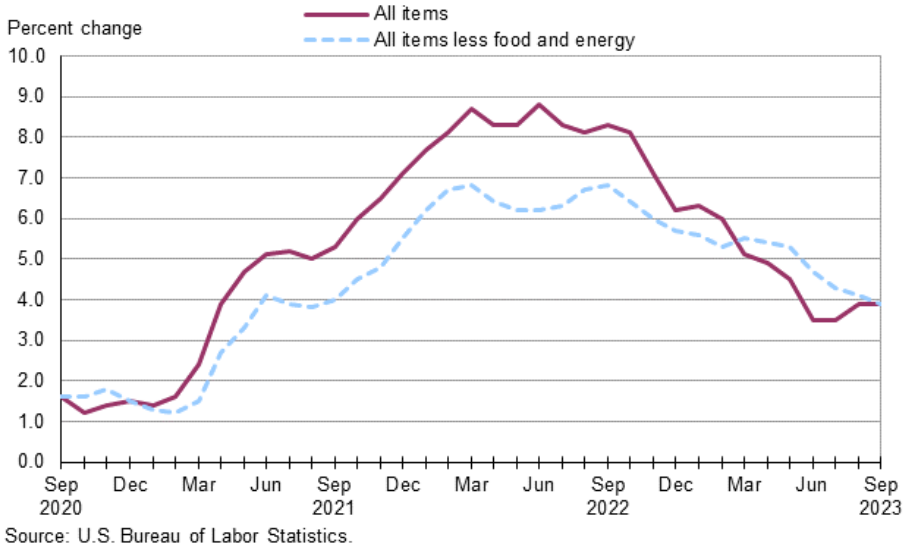


Figure C-3. Consumer Price Index, West Region of the US- 2020-2022



Source: U.S. Bureau of Labor Statistics.

An Article about this BDO Zone in a local Ag Magazine:

WESTERN FarmPress.

Could the valley be a BDO Zone for almond waste?

Company examining the feasibility of building a biofuel industry around Modesto, Calif.



Tim Hearden - August 3, 2023



The Almond Board of California is backing an effort to rate the Modesto, Calif., area for its suitability for a plant that would convert almond tree waste and shells to energy.

A company that facilitates investments in biomass is looking into development opportunities for repurposing almond products in and around Modesto, Calif.

In a project supported by the Almond Board of California, Ecostrat Inc., is preparing a rating for the northern San Joaquin Valley as a Biofuel Development Opportunity (BDO) Zone, which could lead to new biomass plants operating in the area.

BDO zones enable high-potential "biomass-rich" communities to tap into the trillion-dollar bioenergy sector, company officials explain. Ecostrat is conducting a technical risk assessment of biomass feedstock, supply chain and infrastructure attributes of the region to determine its attractiveness to investors.

The analysis is looking at the area's potential for making use of various types of biomass, including fruit and almond tree waste and almond shells, as sources of clean energy.

"These are fantastic feedstocks for the bio-based industry," said Jordan Solomon, Ecostrat's president and chief executive officer. "Biomass means so much more now than burning wood … and making electricity. Now it means making high-value renewable fuels, biochemicals, biogas, and bio-products."

Solomon chairs the BDO Zone Initiative, a rating program that enables economic development bodies to seek biobased projects for their communities. The initiative has a goal of issuing 1,000 BDO zone designations in four years.

Growth market

As Ecostrat explains, clean energy markets are growing at an unprecedented pace, and hundreds of communities in California have surpluses of sustainable biomass. But communities have had no way to quantify their region's opportunities and risks for would-be clean-energy investors.

ADVERTISING

BDO ratings put an internationally recognized "bullseye" on the best areas in the country to build and operate new bio-based manufacturing plants, according to Ecostrat. A coalition of capital markets and investors, including Goldman Sachs and Citibank, have allocated $1 billion toward the initiative.

In all, 22 BDO zone ratings have been issued in North America since early 2021, and the goal is to have 50 of them by Christmas, Solomon said. One of the communities was Libby, Mont., which was given an "A" rating (meaning low risk) for forest, pulpwood and sawmill residuals in October 2022 and has already landed a new manufacturing plant.

"It's almost unheard of" for a plant to be built that quickly, Solomon said. "The fact of the matter is there's trillions of dollars being put toward the energy transition, and trillions more dollars in capital markets looking to deploy and invest in the energy transition.

"Farmers have something very viable," he said. "They have feedstock and biomass. All farmers should be behind BDO ratings because they help farmers get more money. In this case it's for the wood … It could be a revenue source for almond growers and tree nut growers and contribute to on-farm stability."

The project comes as the Almond Board is zeroing in on a set of sustainability goals for 2025, including finding a use for all orchard waste.

The BDO zone rating project is partly funded through a federal rural business development grant, he said.

Almond growers who wish to contribute to the Central Valley rating can contact Ecostrat and be put in touch with an analyst, Solomon said. Visit ecostrat.com.

APPENDIX D: ADDITIONAL INFRASTRUCTURE INFORMATION

Site selection of Beard Industrial District - Modesto, CA

By narrowing down the site focus to the Beard Industrial District, we can provide a more detailed and targeted analysis of the specific risks and considerations associated with biofuel projects in that area.

This approach allows for a deeper understanding of the unique factors at play within the district, including its infrastructure, available resources, zoning regulations, and other relevant aspects. While other sites in the BDO Zone may share similar characteristics, delving into the specific details of the Beard Industrial District will offer valuable insights and information that can be extrapolated and applied to other potential sites within the broader Study area.

The Beard Industrial District is located 10 miles south and east of Modesto, CA. It is an ideal location for biofuel development, with its varied land options and strategic positioning in the Central Valley of California. All land within the Beard Industrial District is owned by Beard Land Development. Leasing terms are available but no outright purchases.

1) Ample Land Options: The Beard Industrial District offers approximately 2000 acres of land that is specifically zoned and developed for commercial and industrial uses. This extensive land availability provides businesses with a range of options for establishing their biofuel projects.

2) Fully Developed Parcels: The district features fully developed parcels, some of which can accommodate up to 100 acres. These parcels come with existing infrastructure, including utilities and road access, enabling businesses to quickly set up their operations and minimize initial construction time and costs.

3) Undeveloped Plots: In addition to the fully developed parcels, the Beard Industrial District also offers undeveloped plots on the outer expanses. This provides businesses with the flexibility to design and construct customized facilities that meet their specific needs. It also allows for potential future expansion and growth as the biofuel sector evolves.

4) Transportation Access: Transportation Access: The district benefits from convenient access to major transportation routes and markets. The Modesto and Empire Traction Company, an internal short-line railroad, serves the district, connecting tenants to Union Pacific and BNSF lines. Additionally, the proximity to highways, the Modesto City-County Airport, and the nearby Port of Stockton ensures efficient logistics and access to broader markets for businesses operating in the area.

MODESTO AND EMPIRE TRACTION COMPANY

M&ET provides rail service to nearly 50 customers in the Beard Industrial District with its 48.7 miles of track and the use of 9 Railpower GenSets. A brief list of industries served by M&ET includes: Del Monte, E & J Gallo Winery, Frito-Lay, G3 Enterprises, Georgia-Pacific, Nestle, Sierra Pacific Distribution, and Stanislaus Food Products Company. M&ET interchanges daily with both BNSF and Union Pacific and provides daily switching service to all industries on the line and is capable of handling 286,000 gross-weight carloads from those industries.

Figure D-1. Beard Industrial District Location

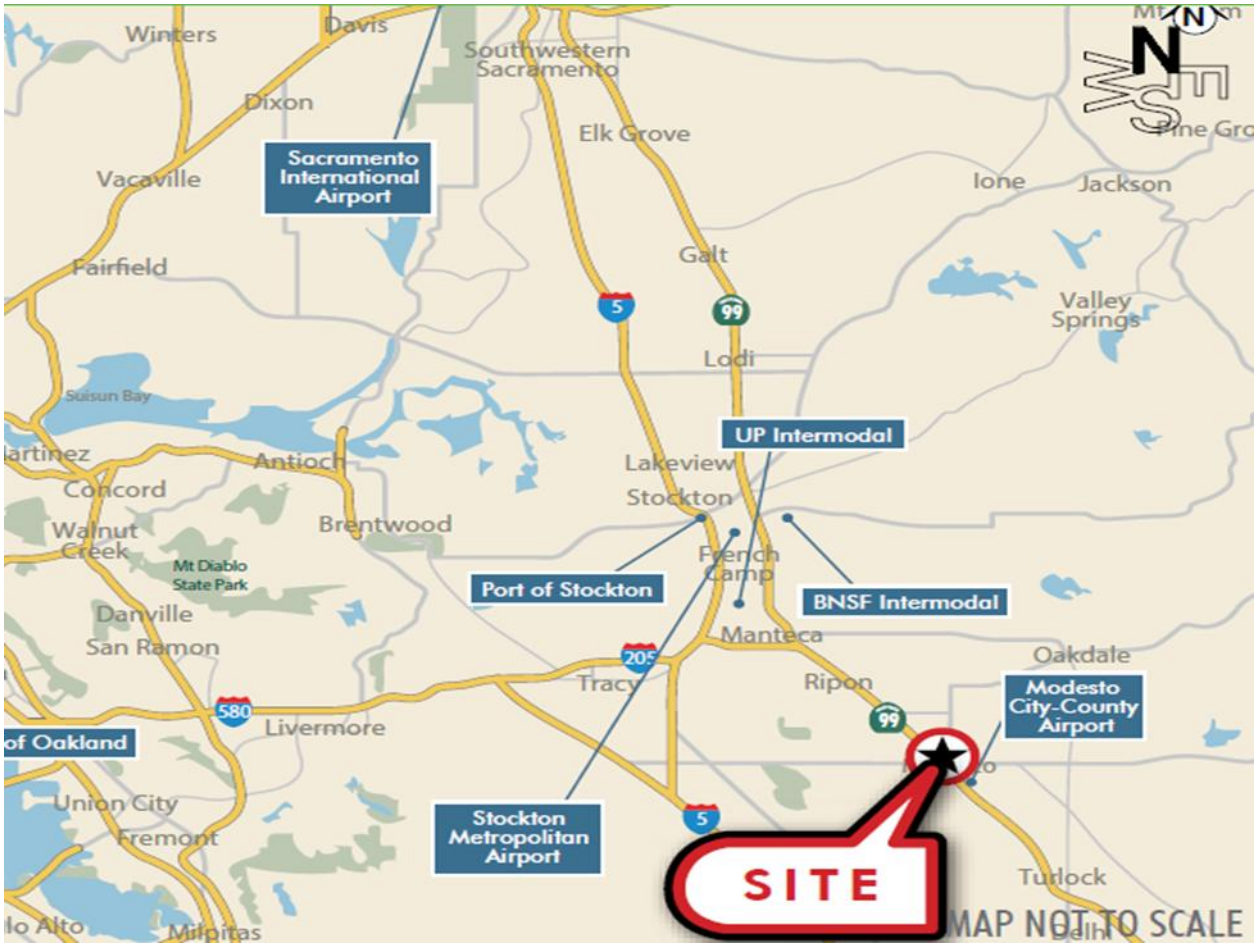


Figure D-2. MET Rail lines within Beard Industrial District



APPENDIX E: LEGAL DISCLAIMER

This BDO Zone Rating (the "Rating") is prepared for, and provided to, BEAM Circular, and is intended to be read and used in its entirety and not in parts. Separation or alteration of any section or page from the main body of this Rating is expressly forbidden. In preparing this Rating, Ecostrat has used information obtained from third parties or otherwise publicly available. All such information has not been independently validated, verified, or confirmed by Ecostrat (except where otherwise specifically indicated) and Ecostrat makes no representation or warranty as to the accuracy or completeness of any information provided by third parties or otherwise publicly available.

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