Bioeconomy Development Opportunity Zone Rating Swan River, MB
Date of Issue: April 29, 2024
Rating Grade: **'BBB'**

BBB
Good Quality

Rating Parameters:

Category	Rated Quantity	Delivered Price	BDO Zone Size
Wood chips	20,000 odt/yr	$88-$92/odt	120-km drive
Sawdust and bark	5,000 odt/yr	$30-$34/odt	distance from Swan
Forest residues	25,000 odt/yr	$70-$100/odt	River, MB

BDO Zone Assets

- **Access to 50,000 odt/yr of wood fibre**
- **Over a decade of forest residue supply chain experience**
- **Supply assurances under long-term offtake agreement**
- **New bio-projects located in the vicinity of the Town of Swan River would have major locational advantages relative to existing competitors**
- **No additional investments required in feedstock logistics, infrastructure, or workforce**

BDO Zone Liabilities

- **Only one potential supplier of sawmill residues located in the vicinity of Swan River**
- **Long-term timber supply uncertainty stemming from licensing issues**
- **Active public opposition to forest industry in the form of legal disputes and environmental NGO initiatives**

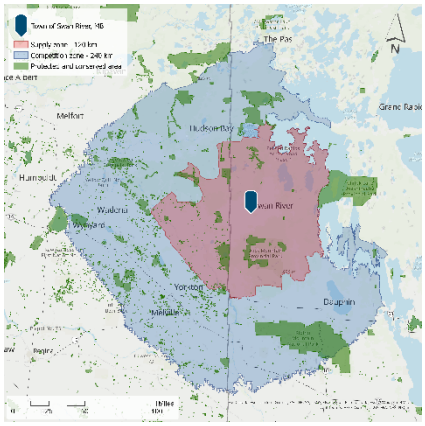
Rating Grade

The Swan River, MB, Bioeconomy Development Opportunity Zone is rated 'BBB,' or 'low-moderate' 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*), and C (*high*).

'BBB' ratings indicate good prospective viability of Feedstock Supply and Infrastructure (FS&I), and expectations of FS&I risk are currently low in the Zone. Capacity to support new biobased plant operations is considered adequate, but adverse weather, supply chain, economic, or infrastructure conditions are more likely to impair this capacity over time.

Swan River, MB BDO Zone



Scoring & Rating Methodology

In assessing the biomass supply chain risk for the Bioeconomy Development Opportunity (BDO) Zone, 88 Risk Indicators from the Canadian 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 oven-dry tonnes (odt), while feedstock costs are expressed in Canadian dollars (CAD). Maximum transport distance is based on a 120-km driving distance from the center point (Swan River, MB).

The BDO Zone rating is based on an aggregation of the scores assigned to each BDO Zone Risk Indicator (RI) assessed in this report. First, each BDO Zone Risk Indicator is given a **Raw Risk Likelihood (RRL)** score, which denotes the likelihood of a risk to future BDO Zone projects due to the Risk Indicator. RRL Scores are scaled as either *very low* (2), *low* (4), *medium* (6), *high* (8), or *very high* (10).

Each BDO Zone Risk Indicator is given a **Raw Risk Impact (RRI)** score, which denotes the impact on a future BDO Zone project due to the Risk Indicator. RRI scores are scaled as either *very low* (2), *low* (4), *medium* (6), *high* (8), or *very*

high (10). Impact level scores are based on the impact level of a risk on the successful development and deployment of a BDO Zone project, with no mitigation measures.

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

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.

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

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

The total risk rating for the BDO Zone is the average of all Loaded RI scores. The BDO Zone score for Location is ***22.60 out of 100, resulting in a 'BBB' designation***.

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

Analyst Notes

The Swan River, MB BDO Zone is located in the boreal transition zone in mid-western Manitoba. The forests in the region are generally mixed with a hardwood-to-softwood ratio of approximately 65:35. Tree species common to the region include trembling aspen, balsam poplar, and white spruce.

The BDO Zone is defined by a 120-km drive distance from the Town of Swan River, encompassing an area of ~25,000 square km. Quantities and prices of feedstock available for new projects were estimated by assessing sawmill and forest residue production in this area. Competition risk was assessed over a broader area that extends to The Pas, MB in the north, Humboldt, SK in the west, Fort Ellice in the south, and Lake Winnipegosis in the east (defined by a 240-km drive distance).

Lumber production in the BDO Zone over the past five years has averaged approximately 51 MMBF/yr, 98% of which is produced by the Spruce Products Limited (SPL) softwood sawmill in Swan River (est. 1946). We confirmed through outreach that a total of at least 26,000 odt/yr of wood chips and 14,000 odt/yr of bark and sawdust is available for new bio-projects in the region. Of this amount, we rated 20,000 odt/yr of wood chips and 5,000 odt/yr of bark and sawdust for new projects, at a delivered price range of $88-92/odt for wood chips and $30-34/odt for bark and sawdust.

While risks of supplier breach are significant due to the low number of suppliers, no additional investments in infrastructure or workforce would be required to bring the rated quantities to market. There are over 35 chip vans/trailers that could be made available to ensure timely delivery of the rated quantity. Twenty-two of the chip vans are owned by SPL.

Approximately 25,000 odt/yr of forest residues are also available for new projects given current harvesting levels. Regional comminution and transportation capacity is sufficient to ensure a reliable supply at a delivered price of $70-$100/odt. Operations managers and contractors sustained a comparable forest residue supply during the 2009-2018 period.

BDO Zone Assets

A new bio-project located in Swan River is likely to operate without any competition. The only significant competitor for SPL's residual wood fibre (a paper mill) is located 240 km from Swan River and has experienced production curtailments that can be tied to paper market declines. The paper mill's historical consumption of sawmill residues generated in Swan Valley reflects the lack of alternative buyers for this feedstock in the region.

Due to its locational advantage (<10 km transportation distance), a new project in Swan River could secure the entire sawmill residue supply with a marginal price premium. Certainty could be

improved with long-term offtake agreements with SPL.

The large transportation capacity and well-maintained road infrastructure in Swan Valley assure seamless wood fibre deliveries and scheduling. Only a small percentage of the approximately 35 chip vans/trailers available in the region would be required for deliveries of the rated quantity. Previous experience in forest residue recovery provides additional supply assurances.

BDO Zone Liabilities

SPL is the only sawmill in the region capable of supplying significant quantities of sawmill residues to new projects. All other sawmills in the region have lumber production <1 MMBF/yr and corresponding sawmill residue production <5,000 odt/yr. Any significant reduction in SPL milling activity resulting from lumber market downturns or other factors would be detrimental to a new project. For example, if SPL lumber production declined by 25%, the rated quantity of sawmill residues would not be available. Although SPL's lumber production has never dropped to this level, this is a significant risk that can only be mitigated through procurement of alternative feedstocks like forest residues (e.g., unmerchantable trees and tree components).

Legal tensions between First Nations, the forest industry, and the Manitoba government elevate wood supply risks. At least three ongoing lawsuits initiated by federal and provincial First Nations groups pertain to territorial and wildlife concerns. Additional legal actions may arise, potentially constraining the availability of wood fibre over time.

Infrastructure Profile

The suitability of regional infrastructure for new bio-projects was assessed using a potential project site in Swan River's industrial park. The site is located 4.5 km from SPL and is zoned for heavy industrial development with excellent access to primary roadways and railways. New bio-projects would have direct access to natural gas, high-speed internet, electricity, and water supply. Regional social infrastructure is well developed and includes a 20-year-old regional health facility and high school and college-level technical programs. With high regional workforce availability and comparatively low labour costs, the Swan River industrial park provides an ideal location for developers interested in utilizing the sawmill residue supplies available from SPL.

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Figure 1: Risk Indicators (Sorted by Risk Level)

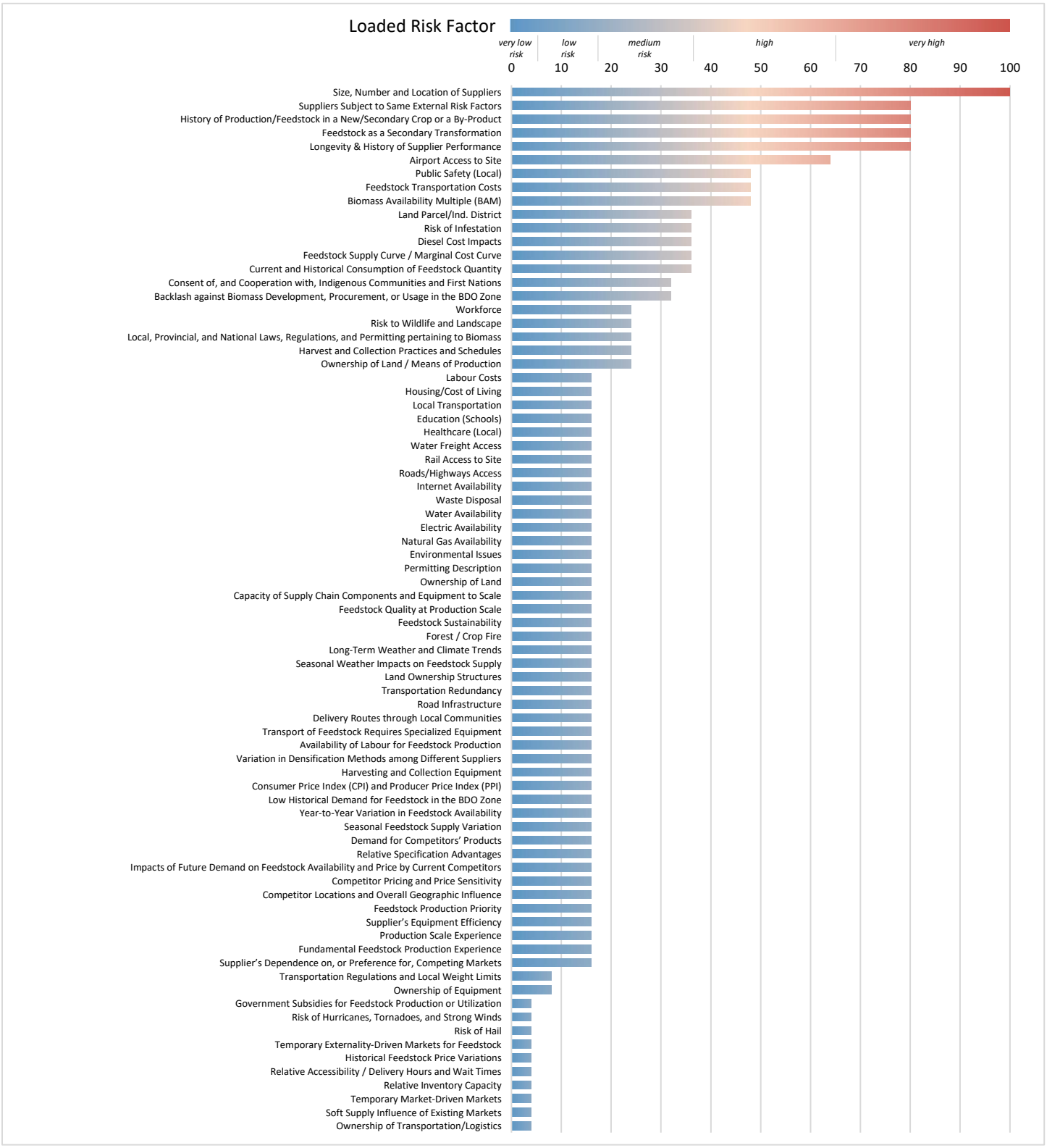


Table 1: Risk Indicators and Associated Scores

	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	8	10	80	NN	80
1.2.1	Supplier's Dependence on, or Preference for, Competing Markets	4	4	16	NN	16
1.3.1	Ownership of Land / Means of Production	4	6	24	NN	24
1.3.2	Ownership of Equipment	2	4	8	NN	8
1.3.3	Ownership of Transportation/Logistics	2	2	4	NN	4
1.3.4	Feedstock as a Secondary Transformation	8	10	80	NN	80
1.4.1	Fundamental Feedstock Production Experience	4	4	16	NN	16
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	4	4	16	NN	16
	Category 2.0: Competitor Risk					
2.1.1	Competitor Locations and Overall Geographic Influence	4	4	16	NN	16
2.1.2	Current and Historical Consumption of Feedstock Quantity	6	6	36	NN	36
2.1.3	Competitor Pricing and Price Sensitivity	4	4	16	NN	16
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	2	2	4	NN	4
2.1.6	Temporary Market-Driven Markets	2	2	4	NN	4
2.2.1	Relative Inventory Capacity	2	2	4	NN	4
2.2.2	Relative Accessibility / Delivery Hours and Wait Times	2	2	4	NN	4
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)	6	8	48	NN	48
3.1.2	Feedstock Supply Curve / Marginal Cost Curve	6	6	36	NN	36
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	2	2	4	NN	4
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	8	10	80	NN	80
3.3.1	Consumer Price Index (CPI) and Producer Price Index (PPI)	4	4	16	NN	16
3.3.2	Currency Risk	NR	NR	NR	NR	NR
3.3.3	Border Risk	NR	NR	NR	NR	NR
3.3.4	Temporary Externality-Driven Markets for Feedstock	2	2	4	NN	4
3.4.1	Harvest and Collection Practices and Schedules	6	4	24	NN	24
3.4.2	Harvesting and Collection Equipment	4	4	16	NN	16
3.4.3	Variation in Densification Methods among Different Suppliers	4	4	16	NN	16
3.4.4	Availability of Labour for Feedstock Production	4	4	16	NN	16
3.5.1	Feedstock Transportation Costs	6	8	48	NN	48
3.5.2	Diesel Cost Impacts	6	6	36	NN	36
3.5.3	Transport of Feedstock Requires Specialized Equipment	4	4	16	NN	16
3.5.4	Delivery Routes through Local Communities	4	4	16	NN	16
3.5.5	Transportation Regulations and Local Weight Limits	2	4	8	NN	8
3.5.6	Road Infrastructure	4	4	16	NN	16
3.5.7	Transportation Redundancy	4	4	16	NN	16
3.6.1	Size, Number, and Location of Suppliers	10	10	100	NN	100
3.6.2	Suppliers Subject to Same External Risk Factors	8	10	80	NN	80
3.6.3	Land Ownership Structures	4	4	16	NN	16
3.7.1	Seasonal Weather Impacts on Feedstock Supply	4	4	16	NN	16
3.7.2	Long-Term Weather and Climate Trends	4	4	16	NN	16
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	2	2	4	NN	4
3.7.6	Risk of Flood	NR	NR	NR	NR	NR
3.7.7	Risk of Drought	NR	NR	NR	NR	NR
3.7.8	Risk of Hurricanes, Tornadoes and Strong Winds	2	2	4	NN	4
3.7.9	Risk of Low Temperatures	NR	NR	NR	NR	NR
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	6	4	24	NN	24
3.8.3	Backlash against Biomass Development, Procurement or Usage in the BDO Zone	8	4	32	NN	32
3.8.4	Consent of, and Cooperation with, Indigenous Communities and First Nations	8	4	32	NN	32

3.8.5	Food Security Concerns	NR	NR	NR	NR	NR
3.9.1	Feedstock Sustainability	4	4	16	NN	16
3.9.2	Risk to Soil Quality	NR	NR	NR	NR	NR
3.9.3	Risk to Surface and Groundwater	NR	NR	NR	NR	NR
3.9.4	Water Use	NR	NR	NR	NR	NR
3.9.5	Pesticide Risk to Human and Ecosystem Health	NR	NR	NR	NR	NR
3.9.6	Risk to Wildlife and Landscape	6	4	24	NN	24
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					
5.1.1	Land Parcel/Ind. District	6	6	36	NN	36
5.1.2	Ownership of Land	4	4	16	NN	16
5.1.3	Permitting Description	4	4	16	NN	16
5.1.4	Environmental Issues	4	4	16	NN	16
5.2.1	Natural Gas Availability	4	4	16	NN	16
5.2.2	Electric Availability	4	4	16	NN	16
5.2.3	Water Availability	4	4	16	NN	16
5.2.4	Waste Disposal	4	4	16	NN	16
5.2.5	Internet Availability	4	4	16	NN	16
5.3.1	Roads/Highways Access	4	4	16	NN	16
5.3.2	Rail Access to Site	4	4	16	NN	16
5.3.3	Airport Access to Site	8	8	64	NN	64
5.3.4	Water Freight Access	4	4	16	NN	16
5.4.1	Healthcare (Local)	4	4	16	NN	16
5.4.2	Education (Schools)	4	4	16	NN	16
5.4.3	Local Transportation	4	4	16	NN	16
5.4.4	Public Safety (Local)	6	6	36	NN	36
5.4.5	Housing/Cost of Living	4	4	16	NN	16
5.5.1	Workforce	6	4	24	NN	24
5.5.2	Labour Costs	4	4	16	NN	16
					Average	**22.60**



Swan River, MB BDO Zone Independent Review Committee (IRC)

Derek Poole – Chief Administrative Officer, Town of Swan River
Uriah Waldner – Executive Assistant, Town of Swan River
Ward Perchuk – Spruce Products Limited
Todd Yakielashek – Louisiana-Pacific Swan Valley OSB
David Chetyrbuk – Regional Forester, Forestry and Peatlands Management Branch, Government of Manitoba
Charlene Gulak – Economic Development Advisor, Rural Manitoba Economic Development Corporation
Lee Evans – Manitoba Hydro
Duane Whyte – Councillor, Town of Swan River

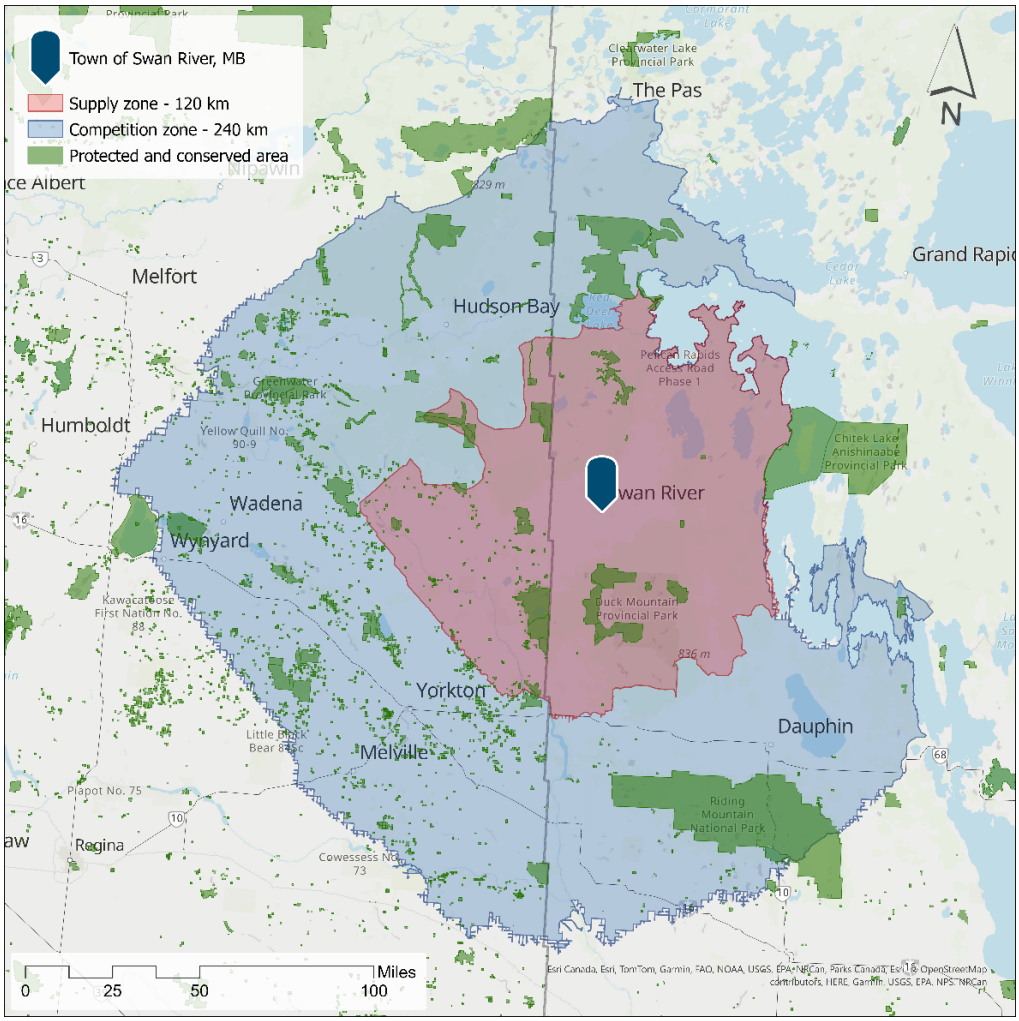
APPENDIX A: BIOMASS AVAILABILITY AND PRICING

OVERVIEW

BDO Zone Risk Indicators are scored with reference to specific feedstock quantities and prices. The rated feedstock quantities are determined by estimating the potential amount of biomass feedstock that can be produced within the BDO Zone (120-km drive distance from the Town of Swan River). This estimate of total potential is reduced based on the expected demand for biomass in the competition zone (240-km drive distance from the Town of Swan River). Finally, a Biomass Availability Multiple (BAM) further reduces the available amount based on a consideration of supply chain constraints (e.g., operational, accessibility, and market constraints) and to account for data/model uncertainty.

The resulting rated feedstock quantities are conservative estimates of availability for new projects. The price range associated with each rated quantity is determined through outreach and market analysis in the competition zone and reflects the anticipated price that a new bio-project would have to pay to secure the rated quantity of biomass. The Swan River, MB BDO Zone and competition zone are shown on Map A-1.

Map A-1: Map of BDO Zone (red) and competition zone (blue)



Evaluated Feedstocks

Sawmill residues: Byproducts of sawmill operations that are produced from conversion of sawlogs into finished wood products, such as lumber and engineered wood. A typical softwood lumber mill converts about 60% of sawlogs into finished wood products. The remaining portion (40%) of sawn timber is transformed during milling into sawmill residues, including wood chips, sawdust, shavings, and bark.[1]

Forest residues: Unmerchantable wood fibre that is recovered during conventional forest operations, including small-diameter trees, stem sections, branches, and other woody debris that remains on site following merchantable roundwood processing. Forest residues can be either processed with mobile comminution units (e.g., grinders) and transported to destination in chip vans or transported with roll-off trailers to a terminal yard or destination for stationary comminution.

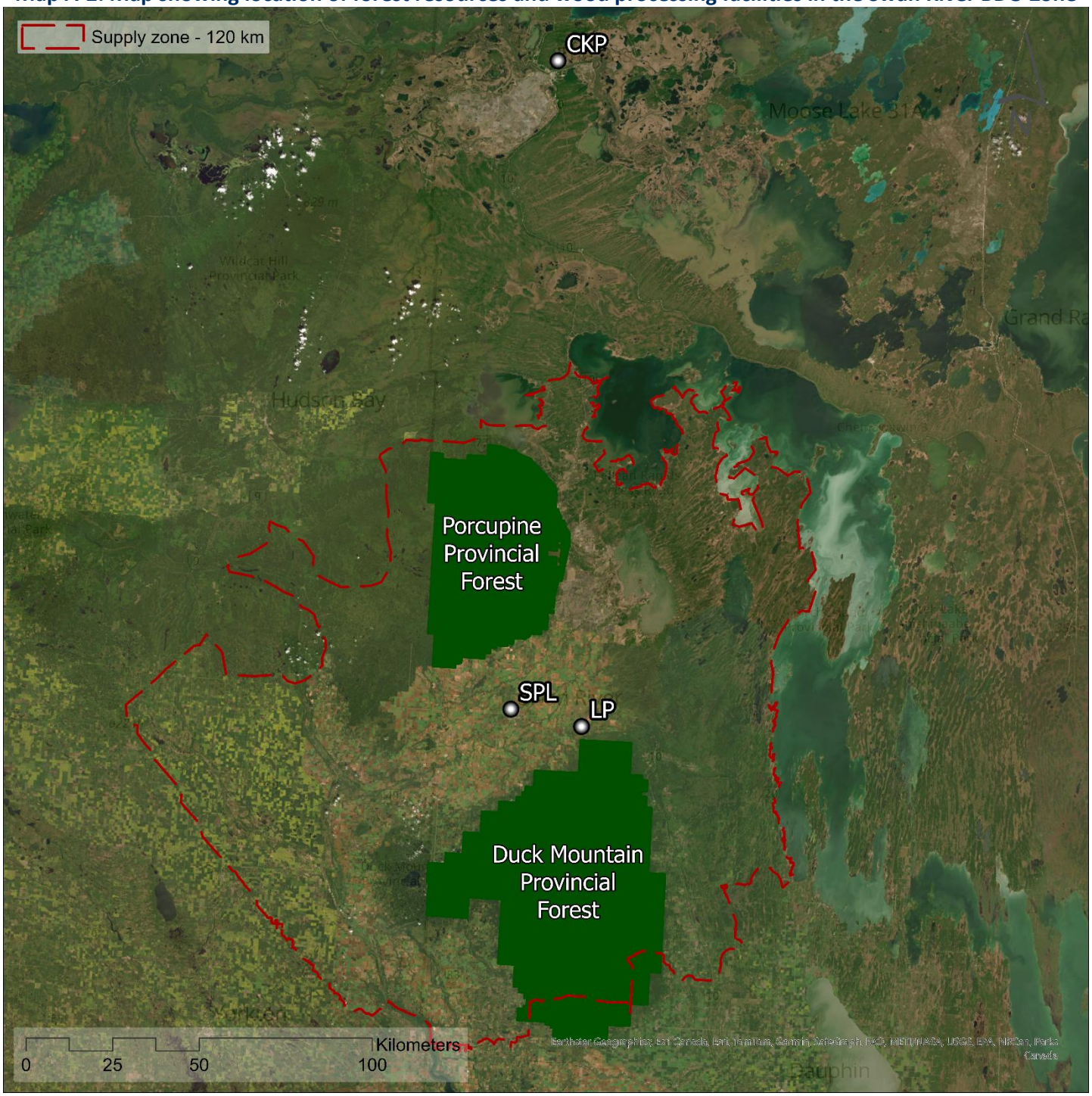
Supply Analysis

Forestry in Manitoba mainly occurs on publicly owned ("Crown") lands. The province is divided into Forest Sections and Forest Management Units (FMUs) within which inventory and planning activities take place. Harvesting on Crown land is permitted under licensing arrangements. Quotas and Forest Management Licenses (FMLs) are the most common. Quotas allow for the annual harvesting of specific volumes/quantities of wood fibre and are allocated to both mills and contractors. Forest Management Licenses (FMLs) are area-based licenses that permit harvesting in large designated areas over 10- to 20-year periods. Presently there are two FMLs planned or active in the province.[2]

The BDO Zone is located in Manitoba's Mountain Forest Section, which includes six FMUs (FMUs 10-15; Map C-1, Appendix C). Forests in the region are classified as boreal or boreal transition and are predominantly mixedwood stands intermixed with pure stands of hardwood composed mainly of balsam poplar and trembling aspen. Pure softwood stands are less common and tend to be composed of commercially undesirable species (e.g., balsam fir). FML #3 encompasses FMUs 10, 11, and 13 in the hardwood-dominant Duck Mountain Provincial Forest and Duck Mountain Provincial Park. Quotas for roundwood procured from Duck Mountain are also held by independent companies and contractors. FMUs 12 and 14 encompass the softwood-dominant Porcupine Provincial Forest and surrounding area, which are harvested under quotas held by companies and contractors. Map A-2 shows the location of the two Provincial Forests in relation to wood processing facilities in the region.

[1] Based on outreach to local experts.
[2] FML #2 is jointly held by Nisokapawino Forestry Management Corporation and Canadian Kraft Paper Industries Ltd. and covers the area further north of Swan Valley around The Pas, MB. FML #3 is being applied for by Louisiana Pacific (LP) and includes FMUs 10, 11 and 13 in Swan Valley.

Map A-2: Map showing location of forest resources and wood processing facilities in the Swan River BDO Zone



*Note: "CKP" = Canadian Kraft Paper (The Pas, MB); "SPL" = Spruce Products Limited (Swan River, MB); "LP" = Louisiana-Pacific mill (Minitonas, MB).

Timber harvesting involves variable retention, whereby patches of forest ranging in size from 2 to 20 hectares are clearcut, and surrounding forests are retained.[3] Harvested volumes from the Mountain Forest Section over the last five years are reported in Table A-1. The data shows a relatively stable year-to-year harvest, with maximum variation of no more than 50,000 m^3/yr from the average. Approximately 75% of all roundwood is sourced from Duck Mountain (FMU 10, 11, and 13), with approx. 20% sourced from Porcupine Provincial Forest (FMU 12 and 14) and the remaining 5% sourced from surrounding private forest lands in Manitoba and Saskatchewan.[4] Harvesting activity is driven mainly by the demands of Louisiana-Pacific for hardwood (trembling aspen and balsam poplar) and Spruce Products Limited for softwood (mainly white spruce).

Table A-1: Quantities harvested annually from the Mountain Forest Section, 2018/19-2022/23[5]

Year	Hardwood (gt)	Softwood (gt)	Total (gt)
2018/19	357,872	187,048	544,920
2019/20	266,327	194,735	461,062
2020/21	337,159	174,823	511,982
2021/22	354,708	155,864	510,572
2022/23	362,378	183,823	546,202
5-year average	335,689	179,259	514,948

*Note: Volume estimates were converted to green tonnes (gt) by assuming 0.65 gt/m^3 for softwood and 0.95 gt/m^3 for hardwood[6]

Sawmill residue:

The Spruce Products Limited (SPL) sawmill in Swan River is the only facility in the BDO Zone capable of supplying new projects with sawmill residue.[7] The mill processes approximately 200,000 tonnes/yr of roundwood annually, producing 50 MMBF/yr of softwood lumber. We determined through outreach that 26,000 odt/yr of wood chips could be available for a new project at a price of $78-80/odt FOB and an additional 14,000 odt/yr of sawdust and bark could be available at a price of $20-22/odt FOB (Table A-2).

Table A-2: Sawmill residue production and pricing for new projects, by type[8]

	Quantity available (odt/yr)	Price range ($/odt FOB)
Wood chips	26,000	78-80
Sawdust	7,000	20-22
Shavings	--	--
Bark	7,000	20-22
Total	40,000	20-80

[3] LP Canada Ltd. (February 28, 2022). Forest Management License #3 – 2022-2024 Operating Plan. Volume I: Harvest and Renewal Plan. (p.24)
[4] Note that much of the wood supply from private land in recent years has been produced from land clearing activities (for cropland establishment) and therefore is not a sustainable source of wood fibre.
[5] Volume estimates were provided by the Manitoba Forestry and Peatlands Management Branch using the provincial timber reporting system.
[6] Based on outreach to local experts.
[7] Other sawmills in the region have low capacity (<1 MMBF/yr) and operate seasonally. The small quantities of residue generated by these establishments tend to be used internally as fuel or as feedstock for value-added products (e.g., pellets).
[8] Green tonnes were converted to oven-dry tonnes using the following moisture content assumptions: Wood chips = 40%, sawdust + bark = 40%.

Forest residue:

Forest residue can be produced as a byproduct of logging operations and includes small-diameter trees, as well as stem sections, branches, and tops. Two approaches to forest residue recovery could be used. Chipping operations would involve the use of SPL's three mobile delimber-debarker-chippers (DDCs) whereas grinding operations would use the four mobile grinder units already available in the region.

Through outreach and literature review we determined that forest residue could be produced at a ratio of 0.15 units for every 1 unit of merchantable roundwood. This estimate accounts for sustainability and handling constraints. Applying this factor to the average annual roundwood production in the Mountain Forest Section over the 2018-2023 period yields a forest residue potential of ~40,000 odt/yr (Table A-3).

Table A-3: Expected forest residue production given sustainability requirements and handling losses

	Hardwood (odt/yr)	Softwood (odt/yr)	Total (odt/yr)
Expected average annual forest residue production	25,177	13,444	38,621

For a roundwood recovery of 100-150 m^3 per hectare, which is common in the region, our residue recovery assumption equates to 6-9 odt/ha.[9] This estimate is conservative compared to estimates reported for similar forest types in Canada, which range from 7-17 odt/ha.[10] The estimate of 6-9 odt/ha is expected to account for regulatory, operational, and site-specific constraints in the region, including the requirement for logging contractors to return 2/3 of residue to cutovers,[11] losses resulting from handling, comminution, and loading, the practice of redistributing a portion of unmerchantable wood fibre on roads to limit public access,[12] and the need to retain branches in jack pine stands for natural regeneration.[13]

Competition Analysis

Sawmill residue:

The ~26,000 odt/yr of wood chips generated annually by SPL are currently sold to the Canadian Kraft Paper, Inc. (CKP) paper mill in The Pas, MB. Wood chips are loaded into Super B trailers and transported ~240 km to the mill. The ~14,000 odt/yr of sawdust and bark are used to fuel SPL's boilers and as feedstock for the SPL pellet line. This arrangement has been stable for over five years. The Louisiana-Pacific wood panel mill intakes roundwood only and uses all residual bark as boiler fuel. The Weyerhaeuser OSB mill in Hudson Bay, SK, is located within a 172 km drive distance of Swan River but does not procure wood fibre from the BDO Zone.

Forest residue:

There is currently no demand for forest residue. From 2009 to 2018, forest residue was procured from forests in the BDO Zone by CKP to fuel its cogeneration unit. Both whole-tree chipping and mobile grinding operations were used during this

[9] Assumes 0.80 green tonnes per m^3 and 50% moisture content
[10] Ralevic et al. (2010). Assessing forest biomass for bioenergy. Forestry Chronicle 86(1). Report odt/ha values for Ontario boreal forest of 6.9-16.6 odt/ha.
[11] During the 2008-2018 period when forest residues were produced in the area, the Manitoba Forestry and Peatlands Management Branch imposed precautionary rules around biomass recovery and retention that required contractors to return ~2/3 of produced residue to cutovers.
[12] LP Canada Ltd. (February 28, 2022). Forest Management License #3 – 2022-2024 Operating Plan. Volume I: Harvest and Renewal Plan. (p.20)
[13] LP Canada Ltd. (February 28, 2022). Forest Management License #3 – 2022-2024 Operating Plan. Volume I: Harvest and Renewal Plan. (p.36)

time. The CKP mill stopped buying forest residue following an ownership change in 2018. Annual consumption of forest residue by CKP during this period ranged from 20,000 – 30,000 odt/yr.[14]

Rated Quantities and Pricing

A new project located in Swan River would have a significant competitive advantage relative to CKP: the average haul distance to CKP is 240 km, compared to <150 km for a project located near the Town of Swan River. The final rated quantity of sawmill residue selected for the risk evaluation is 25,000 odt/yr, or approx. 60% of all residue available from SPL. This was calculated by applying a Biomass Availability Multiple (BAM) of 1.5x to the total amount of sawmill residue available (40,000 odt/yr). The resulting estimate of 26,666.66 odt/yr was rounded down to 25,000 odt/yr. Of this amount, we estimate that 20,000 odt/yr of wood chips (80% of total chip production) could be secured by a new project under a long-term offtake agreement for the rated price range of $78-80/odt FOB, $88-92/odt delivered.[15] An additional 5,000 odt/yr of sawdust and bark could be secured for a price of $20-22/odt FOB, $30-$34/odt delivered (Table A-3).[16]

Table A-3: Available and rated quantities and corresponding rated price range for evaluated biomass types

Biomass types	Available quantity (odt/yr)	Rated quantity (odt/yr)	Rated price range ($/odt delivered)
Sawmill residue	40,000	25,000	--
-Wood chips	26,000	20,000	88-92
-Sawdust	7,000	2,500	30-34
-Bark	7,000	2,500	30-34
Forest residue	40,000	25,000	70-100

*Note that the final rated quantity of wood chips, sawdust, and bark was selected to be conservative: SPL has indicated that up to 26,000 odt/yr of wood chips and 14,000 odt/yr of sawdust and bark are available at the rated prices. The final rated quantity was selected to ensure resilience to external factors that might decrease availability, particularly sawmill curtailment (see Risk Indicator 3.1.1 for further details).

To conservatively estimate the amount of forest residue available for a new project, the total potential production (40,000 odt/yr) was divided by a Biomass Availability Multiple (BAM) of 1.5x. The resulting estimate of 26,666.66 odt/yr was rounded down to 25,000 odt/yr. Securing this quantity would require only two to three chippers or grinders, less than half the available regional capacity.[17] We determined through outreach that the average price of processed forest residue is approximately $50/odt. This includes a stumpage fee of ~$20/odt for the roundwood portion and average chipping and grinding costs of $30/odt.[18] Transportation costs in the region are approximately $175/hour for chip vans. Assuming a 2-to-4-hour drive time (which approximates a 100-120 km transport distance) and a payload of 16 odt, the cost of transporting forest residue to a project site at Swan River would be $22-$44/odt delivered. The final delivered cost for forest residue is estimated to be $72-94/odt (rounded to $70-$100/odt; Table A-3).

[14] Determined through outreach to local forestry professionals.
[15] Assumes that new project would have to pay full hourly rate ($175/hour) to have chip vans with payload of 27 tonnes (16 odt @40% moisture content) deliver residue from SPL to a project sited in Swan River (<10 km transport distance).
[16] Note that the estimate of sawmill residue potential is near the minimum of historical residue production at SPL over the 2014-2023 period: residue production did not decrease below 40,000 odt/yr over this period. We expect that this is a conservative estimate of average annual sawmill residue production in future years.
[17] Assumes average comminution productivity of 18-20 odt/PMH, 5 PMH/day, and 200 operating days/year.
[18] Based on outreach to local experts.

APPENDIX B: RISK INDICATOR SCORING METRICS

CATEGORY 1.0: SUPPLIER RISK

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

1.1.1 Longevity & History of Supplier Performance

Rationale: Number of years in business is a positive indicator of future solvency. Historical performance is an indicator of future performance.

Risk Information: The regional forest industry has remained stable over the past decade despite lumber market cyclicality and historical decline in the North American pulp and paper industry. Harvesting activity in the Mountain Forest Section has been anchored by the Spruce Products Ltd. softwood sawmill (SPL, est. 1946)[19] and the Louisiana-Pacific wood siding product mill (LP, est. 1998). Both mills continue to make investments to optimize processes and modify product outputs in response to changing market demands.[20]

Although the SPL sawmill has been operating for over 70 years, supplier performance risk is elevated by the lack of alternative suppliers of sawmill residue in the BDO Zone. SPL lumber production curtailment is unlikely given its historical performance. However, a new project dependent on wood chips, sawdust, and/or bark would be jeopardized in the event of prolonged SPL production declines or closure.

There are three large, multi-crew logging companies/contractors in the region, all of which have been in operation for over 10 years. There are an additional 10-20 small single-crew contractors, including operators for which forestry revenue is secondary to alternative revenue streams (e.g., farming, trucking). There are few examples of forestry contractors that have ceased operations in recent years.

Raw Risk Likelihood (RRL) The risk likelihood is deemed *high*, therefore the RRL is 8 out of 10.	**Score** **8**
Raw Risk Impact (RRI) The risk impact is deemed *very high*, therefore the RRI is 10 out of 10.	**Score** **10**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL × RRI) is 80 out of 100.	**Score** **80**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 80 out of 100.	**Score** **80**

[19] SPL has been operating in MB since 1942 and produces dimensional softwood lumber, wood chips, wood shaving , and softwood pellets for the residential market (https://www.wildernesscommittee.org/sites/default/files/2021-06/louisiana-pacific-fmp-ch1.pdf, p.8)
[20] https://storymaps.arcgis.com/stories/217b32789dab4446a84e91b6447e5fc6

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 suppliers' dependence on competing markets to accept or purchase other products/by-products. During periods of feedstock shortage, such suppliers may be more likely to allocate the scarce supply to a competitor resulting in supply disruptions for the Issuer.

Risk Information: We determined through outreach that a new project would be able to secure the rated quantity of sawmill residues (25,000 odt/yr) for the rated price range with low risk of breach resulting from competition. The only current purchaser of SPL residue (Canadian Kraft Paper, Ltd.) is a 240-km drive distance from SPL. Risk of breach would be moderated with a long-term offtake agreement between a new project and SPL.

There are no competing markets for forest residue.

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

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: Over 95% of regional wood fibre supply is sourced from publicly owned ("Crown") forests. Companies and contractors are granted legal access to timber through Forest Management Licenses (FMLs) or quotas. FMLs are area-based licenses that permit harvesting in large designated areas over 10- to 20-year periods. LP tentatively holds the only Forest Management License (FML) in the area (FML #3), whereas SPL, other sawmills, and forestry contractors hold quotas.[21] Quotas allow for the annual harvesting of specific volumes/quantities of wood fibre and are allocated to both mills and contractors. SPL procures its roundwood supply (from which sawmill residues are produced) from its own quota, from FML #3, and from other quota holders. Uncertainty over the details of the next 20-year FMP, which has yet to be approved, increases risk slightly.

[21] The only other FML in the province (FML #2) is jointly held by Nisokapawino Forestry Management Corporation and Canadian Kraft Paper Industries Ltd. and covers the area further north of Swan Valley around The Pas, MB.

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

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 residue 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 the final feedstock.

Risk Information: Sawmill residue production is not subject to equipment ownership risks. All equipment associated with sawmill residue production and handling is owned by SPL and is not subject to significant downtime for maintenance and repair.

There is an oversupply of harvesting and comminution equipment relative to what is required to produce the rated quantity of forest residue. Harvesting equipment is owned by logging companies and contractors and typically includes feller-bunchers, grapple skidders (wheeled), manual chainsaws, and processors. The entire regional chipping capacity (3 DDCs) is owned by SPL. The 4 grinders available in the region are owned by a mix of companies including SPL, Riehl's Lumber and Logging Inc., Intermountain Contracting Ltd., and Steeprock River Hog.

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 *low*, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL × RRI) is 8 out of 100.	**Score** **8**

Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 8 out of 100.	**8**

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: There are an estimated 35 chip vans available in the region, including 27 Super B trailers (combined 60' length) and 8 53' trailers. Twenty-two of the 60' units are owned by SPL, whereas the remainder are owned by forestry businesses and farmers.[22]

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**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**4**

1.3.4 Feedstock as a Secondary Transformation

Rationale: A secondary transformation dependent upon the production of primary products, e.g., forest residue, 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 residue.

[22] Based on outreach to local experts.

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 production of sawmill and forest residue is dependent on the production of merchantable roundwood. The forest industry in Swan Valley has been relatively stable over the past decades. The industry is anchored by the 78-year-old Spruce Products Limited sawmill (50 MMBF/yr) and the 25-year-old Louisiana Pacific mill (350 MMSF/yr). End product markets for both mills are stable. SPL produces premium kiln-dried spruce and pine lumber. LP produces specialized wood panel siding that is sold in US markets.

Although SPL lumber production has consistently approximated 50 MMBF/yr over the past decade, risk of future declines in end product markets is significantly increased due to the lack of alternative suppliers of sawmill residue in the BDO Zone. Though unlikely, any prolonged declines in housing and lumber markets that directly affect SPL operations could reduce sawmill residue production below the rated quantity. The availability of forest residue in the region moderates this risk.

Raw Risk Likelihood (RRL) The risk likelihood is deemed *high*, therefore the RRL is 8 out of 10.	**Score** **8**
Raw Risk Impact (RRI) The risk impact is deemed *very high*, therefore the RRI is 10 out of 10.	**Score** **10**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL × RRI) is 80 out of 100.	**Score** **80**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 80 out of 100.	**Score** **80**

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: Sawmill residue is a conventional byproduct of sawmilling operations. SPL has optimized recovery, handling, and storage over its 70+-year operating history.

The forestry contractors and companies of Swan Valley have developed forest residue supply chain experience over the period 2009-2018. During this period, 20,000 – 30,000 odt/yr of forest residue produced in the BDO Zone was

transported to the kraft paper mill in The Pas annually. Both mobile and terminal comminution configurations were used. Mobile comminution involved tracked grinders and chip vans (e.g., possum belly, walking floor) and terminal comminution involved the same tracked grinders but with loose residue transport in roll-off containers and comminution at yards. Although the willingness of the CKP mill to pay for residue produced in the Swan Valley region declined in recent years, experience relevant to residue production remains. As reviewed in RI 1.3.2, there are 3 mobile chippers and at least 4 mobile grinders that could be used to support new projects.

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

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 rated quantity of sawmill residue (25,000 odt/yr) constitutes ~60% of average annual residue production by SPL in recent years (40,000 odt/yr). Production of residue over the past decade has exceeded the rated quantity; lumber output at SPL has consistently approximated 50 MMBF/yr.

As reviewed in RI 1.4.1 above, contractors in the region have experience bringing 20,000 – 30,000 odt/yr of residue to market annually, using both mobile and terminal configurations. This is comparable to the rated quantity of forest residue (25,000 odt/yr).

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**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment.	**NN**

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

1.5 Risk Factor: Supplier Harvesting/Collection/Processing Capacity

1.5.1 Supplier's Equipment Efficiency

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

Risk Information: SPL's stationary debarker and chipper are standard equipment for sawmills. There are no issues associated with the efficiency and capacity of these units.

Larger forestry contractors responsible for most roundwood production have no issues with equipment age and efficiency. Some smaller contractors have older equipment, requiring more downtime and O&M expenses. The 3 chipping units owned by SPL and the 4 grinders available in the region are generally in a good state of repair with productivities ranging from ~20-25 odt/PMH.

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 *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **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 residue (e.g., pulpwood)) supply may not be a top priority for a supplier.

Risk Information: Sawmill residue is a conventional byproduct of milling operations, with streamlined mill-to-market collection, sorting, and loading processes.

Forest residue accumulates at roadside as a consequence of conventional roundwood harvesting operations. Although delimbing practices may change slightly to maximize recovery of residue, this is not expected to impact roundwood production costs.
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** *RRL Mitigation (Notch)* **NN** No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).
Loaded RI Score **Score** The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100. **16**

CATEGORY 2.0: COMPETITOR RISK

2.1 Risk Factor: Influence on Feedstock Supply of Existing Markets

2.1.1 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: SPL currently sells its entire production of wood chips (~26,000 odt/yr) to the Canadian Kraft Paper (CKP) mill in The Pas, which is located 240 km north of Swan River. Sawdust, bark, and shavings generated by SPL are used internally for other products (animal bedding, pellets) and as fuel for the mill's boilers. Small sawmills in the region, including Riehl's Lumber & Logging and the Roblin post mill, generate small quantities of residue that tend to be used internally as fuel or as feedstock for other products (e.g., pellets). The long distance of the CKP mill from Swan River (240 km) significantly reduces risk associated with competitor location and geographical influence.

There are currently no buyers of forest residue in the region. From 2009-2018, the paper mill in The Pas purchased residue (20,000 – 30,000 odt/yr) produced in Swan Valley but has not purchased since ownership changed in 2018. Locational risks are significantly reduced due to the distant geographic position of the CKP mill relative to the forest resources of the BDO Zone.

Raw Risk Likelihood (RRL) **Score** The risk likelihood is deemed *low*, therefore the RRL is 4 out of 10. **4**
Raw Risk Impact (RRI) **Score** The risk impact is deemed *low*, therefore the RRI is 4 out of 10. **4**
Gross Risk Indicator (GRI) **Score** The Gross Risk Indicator (RRL × RRI) is 16 out of 100. **16**

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

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: All sawmill residue generated annually in the BDO Zone (~40,000 odt/yr) is fully utilized. Chips are delivered to CKP, shavings and sawdust are used for animal bedding and pellet products, and hog fuel (bark) is utilized as fuel at SPL, LP, CKP, and the other smaller mills in the region. The largest buyer of residue is CKP, which purchases approx. 26,000 odt/yr of wood chips from SPL.

The previous buyer of forest residue (CKP) stopped purchases in 2018 following an ownership change. Transportation costs and increasing diesel prices likely accounted for the decision by the new owners to stop purchasing forest residue from the Mountain Forest Section. Quantities of forest residue delivered to CKP from within the boundaries of the BDO Zone during the 2009-2018 period ranged from approx. 20,000 – 30,000 odt/yr.

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

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 a 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: Outreach to local forestry professionals led to the conclusion that there has been no significant volatility in sawmill and forest residue prices in recent history. CKP's ability to engage in price competition with a new project is constrained by its distance from SPL (~240 km).

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

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 zone can make suppliers overconfident, leading to a supplier-controlled market where short-term contracting becomes the norm and supply chain reliability is compromised for the Issuer. If and when it occurs, increased demand on feedstock may decrease availability and increase cost for new plants within the BDO Zone.

Risk Information: There are no indications that CKP and other potential competitors to new bio-projects are positioned to increase feedstock demand from the BDO Zone. Hog fuel consumption within the boilers at SPL and LP are not affected by market demand and pricing. Any increase in future demand for wood fibre by CKP is not likely to affect the rated quantity of sawmill residue or forest residue for new projects located in Swan River. Note that most of the forest residue supply for CKP would be sourced from forest operations outside of the BDO Zone in the vicinity of the CKP mill (FML #2).

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 *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**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 of feedstock, especially during times of shortage. This control can derive from qualitative or "soft" factors, such as long previous relationships between local suppliers and existing markets for feedstock.

Risk Information: Outreach confirmed that a new project in the area would have access to the rated quantity of sawmill and forest residue for the specified price range. The largest current purchaser of sawmill residue (CKP) is located 240 km away from Swan River; it is highly unlikely that this mill would have a procurement advantage in any future low-supply scenario.

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 *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **4**

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.[23]
Risk Information: There is no history of alternative, non-traditional markets in the BDO Zone and there are no plausible situations where feedstock shortages would result from the emergence of such markets for wood fibre.
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**
RRL Mitigation (Notch) **NN**
No adjustment.
RRI Mitigation (Notch)
No adjustment.
The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).
Loaded RI Score **Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100. **4**

2.2 Risk Factor: Specific Competitors' Competitive Advantage

2.2.1 Relative Inventory Capacity

Rationale: The more inventory a competing biomass facility is able to store, the more competitive pressure it can exert on supply. Ability to store large inventories allows competitors to purchase inventory when the prices are low, potentially giving it an economic advantage. Additionally, the ability to store inventory during feedstock supply surpluses can enable competitors to continue to intake feedstock when the Issuer's plant (with lesser inventory capacity) may be forced to put suppliers on quota. Larger inventory capacity on the part of competing markets thereby creates supplier loyalty and can make it more difficult for new projects to secure supply without paying a significant premium.
Risk Information: The CKP paper mill has sufficient inventory space for about 100,000 m^3 of pulpwood and 100,000 m^3 of chips. This risk is moderated by the mill's distance from Swan River and by the high certainty of supply of the rated quantity of sawmill residue for new projects at the specified price range (as confirmed during outreach).
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**

[23] Bergtold, 2018.

Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**4**

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: Being located 240 km from Swan River, CKP is relatively inaccessible compared to new projects located within the BDO Zone. Other competitors for sawmill and forest residue are small; any relative ease of delivery to those competitors does not pose a substantial risk to new projects.

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

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: Wood chips are the only type of sawmill residue that CKP procures from SPL. The majority of the sawdust and bark generated annually by SPL and the other smaller sawmills in the BDO Zone is used internally as fuel or as feedstock for value-added product lines (e.g., bagged shavings, and pellets). Forest residue has been procured by CKP from the Mountain Forest Section in the past for use as fuel in its cogeneration unit.

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) The Gross Risk Indicator (RRL × RRI) is 16 out of 100.	**Score** **16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**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 the competitor's final product can cause an increased demand for feedstock by the competitor. For example, an increased demand for wood pellets due to high energy prices in Europe or for biofuels due to a favorable clean fuels policy can cause increased pellet/biofuel production by competing markets. Thereby driving demand for feedstock within a BDO Zone.

Risk Information: Continued declines in the North American paper industry indicate that CKP is unlikely to benefit from significant increases in end-product demand. There are no indications that demand for kraft paper will increase beyond historical highs. Residential and cooking pellet markets are expected to continue to grow incrementally but not to a degree that would lead to major production increases at SPL and Riehl's Lumber & Logging.

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 *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**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: There is limited excess supply of sawmill residue available in the BDO Zone. The rated quantity of sawmill residue is equivalent to a BAM of 1.5x (40,000 odt/yr / 25,000 odt/yr). The BAM for wood chips is 1.3x (26,000 odt/yr / 20,000 odt/yr), whereas the BAM for sawdust and bark is 2.8x (14,000 odt/yr / 5,000 odt/yr). While these quantities are expected to be available at low-to-moderate risk with long-term offtake agreements, the relative lack of excess supply (particularly for wood chips) increases vulnerability to exogenous supply-demand shocks. Risk is further increased due to the lack of an alternative supplier of sawmill residue.

For forest residue, the rated quantity is equivalent to a BAM of 1.5x (40,000 odt/yr / 25,000 odt/yr). This is considered a low-risk excess supply due to (1) the conservative approach to residue estimation and (2) previous regional forest residue supply experience equivalent to this quantity.

Overall, due to the small number of suppliers in the BDO Zone and inherent lumber market cyclicality/volatility, this risk is deemed to be medium-high.

Raw Risk Likelihood (RRL) The risk likelihood is deemed *medium*, therefore the RRL is 6 out of 10.	**Score** **6**
Raw Risk Impact (RRI) The risk impact is deemed *high*, therefore the RRI is 8 out of 10.	**Score** **8**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL × RRI) is 48 out of 100.	**Score** **48**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 48 out of 100.	**Score** **48**

3.1.2 Feedstock Supply Curve/Marginal Cost Curve

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

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

Risk Information: A new bio-project located within the municipal boundaries of the Town of Swan River would have a feedstock transport distance of less than 10 km for the entire rated quantity of sawmill residue.

In contrast, the supply of forest residue would be sourced from distances of >80 km. Forest operations in the BDO Zone are concentrated around the Duck Mountain Provincial Forest (DMPF) and the Porcupine Provincial Forest (PPF). The majority of operations (~75%) occur in DMPF, with an average transportation distance to Swan River of 110 km. Approximately 20% of operations occur in the PPF, and are located at a similar average transportation distance from Swan River (110 km; Map A-2, Appendix A). Therefore, most of the forest residue supply is expected to come from distances >100 km (Figure C-1, Appendix C).

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

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[24] and can manifest in shortages and higher costs for Issuers.

Risk Information: Sawmill residue production is ultimately dependent on the ability to maintain a steady supply of roundwood to the mill. SPL operates its sawmill year-round with no seasonal slowdowns. Roundwood supply disruptions that follow curtailments of forest operations during the spring are mitigated by roundwood storage.

Forest operations are curtailed during the spring (March-May) due to inoperability resulting from rain and mud accumulation in the clay soils characteristic of the region. Operations can also be restricted to some extent during the summer months (June-August) due to wildlife protection regulations, particularly those applicable to bird populations. However, harvesting is generally allowed during the summer months if precautionary pre-harvest procedures are followed (e.g., expert interpretation of bird song recordings made in proposed cutblocks).

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**

[24] Golecha & Gan 2016.

Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL × RRI) is 16 out of 100.	**16**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**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: Over the past 10 years, SPL has maintained an average lumber output of ~50 MMBF/yr, with a corresponding regularity in sawmill residue output of ~40,000 odt/yr. Harvested volumes in the Mountain Forest Section over the past 5 years have been relatively stable, ranging from 460,000 – 546,000 m^3/yr (average of 515,000 m^3/yr).

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 *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**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: Sawmill residue pricing has been relatively steady over the past two decades, ranging from $80-$100/odt FOB for wood chips and $10-$30/odt FOB for sawdust and bark. Low price variation can be attributed to a lack of competition.

The only significant purchaser of forest residue in recent history was the paper mill in The Pas, MB (CKP). Forest residue pricing over the 2009-2018 period was approximately $120/odt delivered to the paper mill over a transport distance of ~240 km. This pricing has been largely dependent on the paper mill's dependence on expensive bunker C oil and long transport distances and has not been affected by price competition.[25]

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 *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**4**

3.2.2 Low Historical Demand for Feedstock in the BDO Zone

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

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

Risk Information: The rated quantity of sawmill residue is within the range of historical production and demand. SPL has been generating residue in amounts of ~40,000 odt/yr over the past decade. In recent years, the entire production of residue has been delivered to customers without issue.

Most local experts contacted by Ecostrat who were involved in forest residue supply during the 2009-2018 period agreed that output was relatively constant at around 20,000 – 30,000 odt/yr.

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**

[25] Based on outreach to local experts.

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

3.2.3 History of Production/Feedstock is 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: Sawmill residue is produced as a consequence of conventional lumber production. While lumber production has been steady over the past 5 years, any significant disruption in SPL lumber production would be detrimental to a new project dependent on a single sawmill for supply.

Most contractors in the region have experience with biomass comminution, including that of forest residue.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed *high*, therefore the RRL is 8 out of 10.	**8**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed *very high*, therefore the RRI is 10 out of 10.	**10**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL × RRI) is 80 out of 100.	**80**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 80 out of 100.	**80**

3.3 Risk Factor: Non-Weather Based Externalities

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

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

Risk Information: The Canadian CPI increased significantly during COVID-19 and associated lockdowns. Costs of important inputs to sawmill operations increased during this time by up to 40%. However, this did not affect the throughput of sawlogs and consequent residue generation at the mill. In recent years, prices in Manitoba have trended slightly above the national average (Figure C-2, Appendix C).

Prices for biomass supply chain inputs such as machinery, tires, and diesel increased significantly during the 2020-2022 period. While prices have stabilized in the past year, the elevated price of inputs is still affecting equipment purchase decisions and the profit margins of contractors. However, these concerns are not expected to affect the ability of contractors to procure the rated quantity of forest residue.

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

3.3.2 Currency Risk

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

Risk Information: Not rated.

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 ((1-Total Notch) × GRI Score) is not rated.	**Score** **NR**

3.3.3 Border Risk

Rationale: Where feedstock is transported cross-border to another country, risk exposure to border closures and crossing delays becomes present. The availability of trucks willing to do cross-border runs is limited, which can decrease

supply chain flexibility and resilience. Plants near the US-Canada border, which intake feedstock from both countries, are exposed to these risks.
Risk Information: Not rated**.**
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 ((1-Total Notch) × GRI Score) is not rated. **NR**

3.3.4 Temporary Externality-Driven Markets for Feedstock

Rationale: Alternative, non-traditional, externality-driven competitors for feedstock can drive feedstock demand (and cost) in unusual circumstances. For example, an Issuer using corn stover as a feedstock would not typically compete with the higher-end animal feed market. However, in times of significant hay shortage (e.g., during drought), farmers may use corn stover as hay replacement, driving the price of stover feedstock and decreasing its availability for bio-projects.[26]
Risk Information: No risks relevant to this indicator could be identified. While firewood markets have also been growing in recent years, we determined through outreach that only ~2,000 gt/yr of roundwood (mostly birch) is procured from the Mountain Forest Section and sold as firewood.
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** *RRL Mitigation (Notch)* **NN** No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).
Loaded RI Score **Score** The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100. **4**

[26] Bergtold, 2018.

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: Most harvesting activity involves the use of feller-bunchers during the felling phase and grapple skidders during the yarding phase of operations. Processors section recovered trees into logs and pile unmerchantable wood at roadside.

New projects seeking to procure whole-tree chips or grinded unmerchantable biomass can leverage the existing DDCs and grinders which have long operational histories. The most significant risk to forest residue supply chains relates to the requirement to close tertiary roads as soon as possible following harvesting. Scheduling of comminution and chip van loading operations will require careful management and coordination of all interested parties.

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

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: Machinery employed within the regional forestry supply chain is conventional and proven. Feller-bunchers are used for felling and partial delimbing. Grapple skidders and to a lesser extent cable skidders are used to

extract felled trees to roadside. Roadside processing and product assortment (e.g., roundwood, residue) involve the use of processors. Comminution of piled forest residue would involve the use of the available DDCs and tracked grinders. Comminution would be followed by transportation in chip vans/trailers. When appropriately managed and operated, none of these machines present a risk to feedstock quality or 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** *RRL Mitigation (Notch)* **NN** No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).
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.[27]
Risk Information: If a new bio-project requires wood fibre uncontaminated with bark, it is likely that the three DDCs owned by SPL will be relied upon. In this scenario, the tracked grinders will also be used to process slash and debris leftover from DDC operations. If a new project does not require uncontaminated wood fibre, it is possible that it will rely entirely on the four grinders available in the region. Generally, these concerns are not likely to impact facility operations as long as procurement managers specify feedstock quality expectations and manage the supply chain accordingly.
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**

[27] Huhnke, 2018.

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

3.4.4 Availability of Labour for Feedstock Production

Rationale: Skilled labour shortages can be difficult to remedy in the short-term. Availability of suitable labour in an area can impact the ability to procure sufficient feedstock quantities on required schedules. Labour 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 labour force.

Risk Information: The availability of workers in the BDO Zone is mainly constrained by a low population size (<10,000) rather than by an unwillingness to work. The unemployment rates in the municipalities of Swan Valley West and Swan River in 2016 were 3.9% and 5.0%,[28] which was lower than the 2016 national average (7.0%). As of January 2024, Manitoba had the lowest unemployment rate in the country at 4.0%.[29]

Some contractors contacted during outreach indicated that finding skilled equipment operators is a challenge and that many contractor owner-operators were nearing retirement. This only slightly increases risk, as forestry workforce shortages are currently common throughout North America. There have been no recent examples of companies/contractors being unable to conduct business due to lack of labour, and we expect that future workforce capacity will be sufficient as long as SPL, LP, and some of the smaller value-added producers in the region remain operational. The availability of truck operators was less of a concern to forestry professionals contacted during outreach.

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**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**NN**

[28] https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/Page.cfm?Lang=E&Geo1=CSD&Code1=4620042&Geo2=POPC&Code2=0911&Data=Count&SearchText=Swan%20River&SearchType=Begins&SearchPR=01&B1=All

[29] https://www.jobbank.gc.ca/trend-analysis/job-market-reports/mb/job-market-snapshot

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

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: A new bio-project located within the Town of Swan River would procure the entirety of the rated quantity of sawmill residue available from SPL (25,000 odt/yr) within a 10 km transport distance. There are no significant risks associated with other factors that affect transportation costs, notably truck availability and labour.

The distribution of forest resources relative to the Town of Swan River is such that transportation distances for forest residue are likely to average >100 km (Figure C-1, Appendix C). Transportation costs in the region are approximately $175/hour for chip vans. Assuming a 2-to-4-hour drive time and a payload of 16 odt, the cost of transporting forest residue to a project site at Swan River would be $22-$44/odt delivered. For the higher end of this range ($44/odt), transportation costs would contribute to over 45% of total delivered costs (assuming a $50/odt comminution cost inclusive of stumpage).

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**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 48 out of 100.	**48**

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: Diesel prices in Winnipeg in 2023 were below the national average ($173.01/L vs. $179.36) and were the 7th lowest among major Canadian cities. Inflation-adjusted diesel prices gradually increased over the 2000-2023

period, similar to other regions in Canada (Figure C-3, Appendix C). Patterns in diesel price volatility are also uniform across Canada. Given the long feedstock transport distances expected for forest residue, risk is assessed as medium. As noted in Risk Indicator 3.5.1, transportation costs could contribute to up to 45% of total delivered costs under current diesel pricing.
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** *RRL Mitigation (Notch)* **NN** No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).
Loaded RI Score **Score** The Loaded RI Score ((1-Total Notch) × GRI Score) is 36 out of 100. **36**

3.5.3 Transportation of Feedstock Requires Specialized Equipment

Rationale: Requirements for specialized transport equipment (e.g., walking-floor trailers) can increase supply chain risk. Where there is low availability in required transportation equipment, equipment owners have increased leverage over transportation prices and supply chain resiliency can be lower.
Risk Information: There are over 35 chip vans/trailers available in the region, providing sufficient capacity for the rated quantity of sawmill and forest residue. There is no need for additional specialized equipment.
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** *RRL Mitigation (Notch)* **NN** No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).
Loaded RI Score **Score** The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100. **16**

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: Truck traffic for agricultural and forestry purposes is a regular occurrence in Swan Valley. Under a new sawmill residue supply arrangement between a new project and SPL, deliveries to CKP would likely shift to the new project. Therefore, deliveries of the rated quantity of sawmill residue would not significantly increase truck traffic in the region. Deliveries of the rated quantity of forest residue (25,000 odt/yr) would increase truck traffic by approximately 1,560 trips per year, or 6 trips per day.[30]

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

3.5.5 Transportation Regulations & Local Weight Limits

Rationale: In many BDO Zones, transportation is regulated based on seasonal road conditions. These regulations (e.g., "frost laws") often take the form of weight restrictions or limits on the number of trucks allowed on roads. Such regulations can impede the project's ability to source sufficient feedstock or increase the cost of doing so at certain times of the year.

Risk Information: Manitoba transportation regulations allow for a gross vehicle weight (GVW) of up to 62.5 tonnes for 8-axle B train configurations on RTAC-designated highways.[31] B trains are further limited to a GVW of 56.5 tonnes on A1-designated roads and 47.6 tonnes on B1-designated roads. The maximum allowable GVW for single-trailer configurations with trailer lengths of up to 53' is 47 tonnes (RTAC), 45 tonnes (A1), and 40.5 tonnes (B1).[32]

The distribution of road designations in Swan Valley indicates that sawmill residue supply from SPL to a new project in the Swan River industrial park will be capable of leveraging the maximum allowable GVW of 62.5 tonnes (Map C-2, Appendix C).

Forest residue supply chains will be B1-limited during most times of the year, i.e. subject to a 40.5-tonne GVW limit. Seasonal limitations are also likely, as secondary and tertiary roads in the region are subject to reduced load limits during

[30] Assumes 16 odt payload and 250 working days per year.
[31] RTAC is an acronym for the "Road Transportation Association of Canada"
[32] https://www.gov.mb.ca/mti/mcd/resources/pdf/mb_vehicle_weights_and_dimensions_guide.pdf

the spring (March-June).[33] Road weight allowances of up to 62.5 tonnes are allowed in the winter months (Map C-2, Appendix C).

Overall, existing transportation regulations are not expected to become a major risk for biomass-based projects.

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 *low*, therefore the RRI is 4 out of 10.	**Score** **4**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL × RRI) is 8 out of 100.	**Score** **8**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 8 out of 100.	**Score** **8**

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: Road infrastructure is generally in good repair in Swan Valley. There are some bridges in need of replacement which restrict load size in some areas. Main roads into and out of cutblocks in the region are capable of accommodating GVWs of 62.5 tonnes during the winter months (see RI 3.5.5).[34]

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

[33] https://www.gov.mb.ca/mti/srr/index.html
[34] Based on outreach to local experts.

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: Assuming 15 odt/trip, two trips/day, and 250 operating days/year, the 35 chip vans present in the area are capable of delivering over 250,000 odt/yr. This is 5x the rated quantity of sawmill and forest residue.

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**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**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: A new project will have access to a single supplier of sawmill residue (SPL). Though unlikely given SPL's historical performance, any significant curtailment of SPL operations would be detrimental to the project.

There are at least 5 large, multi-crew logging companies/contractors in the region, all of which have been in operation for over 10 years and produce ~60,000-70,000 m3/yr. Other contractors (approx. 15) are smaller, single-crew operations. There are also a number of smaller operators for which forestry revenue is secondary to alternative revenue streams (e.g., farming, trucking).[35]

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

[35] Based on outreach to local experts.

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

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: Dependency on SPL as a single supplier will render a new project vulnerable to any external shocks that could affect SPL operations. There is no diversity in spatial location or production practices for sawmill residue.

Supplier diversity relevant to forest residue is significant. There are approx. 20 forestry contractors capable of supplying a new project with forest residue. The three DDCs are owned by SPL and the four mobile grinders are owned by other companies/contractors that could supply a new project with forest residue.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed *high*, therefore the RRL is 8 out of 10.	**8**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed *very high*, therefore the RRI is 10 out of 10.	**10**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL × RRI) is 80 out of 100.	**80**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 80 out of 100.	**80**

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 fibre (i.e., the cost that one pays to a

landowner for the right to cut and purchase their wood fibre) 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: The majority of productive forest in the BDO Zone is owned by the government (public or "Crown" land). This includes the forested areas south of Swan River (Duck Mountain Provincial Forest/Park) and north of Swan River (Porcupine Provincial Forest). About 5% of annual wood supply is sourced from private lands, mainly from land-clearing activities by larger farms. Although wood supply from private lands is less sustainable, the share in the total wood supply is not sufficient to impose risk for new projects. The supply of roundwood to SPL is not likely to be impacted by variation in stumpage, although reductions in AAC (which is likely given continued tensions between ENGOs, First Nations, and industry) could have some impact. This would reduce sawmill and forest residue production but is unlikely to reduce production levels below the total rated quantity of 50,000 odt/yr.

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

3.7 Risk Factor: Climate and Natural Risks

3.7.1 Seasonal Weather Impacts on Feedstock Supply

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

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

Risk Information: Harvesting generally stops during the spring, from March to June. It is not possible to operate forestry equipment during this period due to muddy terrain. Seasonal weather events do not affect operations during the remaining 9 months of the year. Year-round log supply to SPL is ensured by building log inventories during the harvesting period (June-March). A future biomass-based project needs to take this into consideration in its inventory management.

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 *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **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: There are no significant climate trends in the Mountain Forest Section that are of relevance to forest operations and resulting roundwood production (and sawmill residue production). The largest fire in recent decades occurred in 1981 in FMU 14 (Porcupine Provincial Forest). Approximately 1/3 of the forest was affected. The last large fire in FMU 13 was in the late 1960s. Tornados and extreme wind events occur infrequently and have not significantly affected forest resources. Although anthropogenic climate change may increase forest fire and tornado activity in Swan Valley in the long term, there is no indication of significant climate change impacts on the forest industry to date.

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

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: Wildfire risk is relatively low in central Manitoba due to the patchwork of agricultural and forest land. The largest fire in recent decades occurred in 1981 in FMU 14 (Porcupine Provincial Forest). Approximately 1/3 of the forest was affected. The last large fire in FMU 13 was in the late 1960s. The risk of fire impacting roundwood supply (and associated sawmill and forest residue production) is assessed as low given the historical trend.

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 *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **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: Approximately 81,000 ha of forest in Duck Mountain Provincial Forest is currently affected by the spruce budworm (Map C-3, Appendix C). Spruce budworm infestation has been present in the region for over 30 years. Control measures previously involved the use of BTK spray (Bacillus thuringiensis var. kurstaki) but the spray has not been applied in the region for about a decade. The current control measure of choice involves salvage harvesting and the creation of buffers around infected areas. It is likely that the spruce budworm population will persist and/or grow in future years, posing a moderate risk to roundwood supplies (and derived sawmill and forest residue) in the region.

Raw Risk Likelihood (RRL) The risk likelihood is deemed *medium*, therefore the RRL is 6 out of 10.	**Score** **6**
Raw Risk Impact (RRI) The risk impact is deemed *medium*, therefore the RRI is 6 out of 10.	**Score** **6**
Gross Risk Indicator (GRI) The Gross Risk Indicator (RRL × RRI) is 36 out of 100.	**Score** **36**
Mitigation/Notching *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 36 out of 100.	**Score** **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: Hailstorms have been known to affect forests through de-branching and de-foliation. These events are exceedingly rare and constitute a very low risk to the rated supply of forest residue.

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 *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **4**

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: Not rated.

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 ((1-Total Notch) × GRI Score) is not rated.	**Score** **NR**

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 residue 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: Not rated.

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 ((1-Total Notch) × GRI Score) is not rated.	**Score** **NR**

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: A windstorm in 2012 levelled ~80,000 ha of forest in the BDO Zone. No other major wind-related forest disturbances have occurred since this time.[36] These events are rare and constitute a low risk to new projects.

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 *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100.	**Score** **4**

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: Not rated**.**

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 ((1-Total Notch) × GRI Score) is not rated.	**Score** **NR**

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.

[36] Based on outreach to local experts.

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: There are no programs in place supporting biomass production and utilization in Manitoba.
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**
RRL Mitigation (Notch) — **NN**
No adjustment.
RRI Mitigation (Notch)
No adjustment.
The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).
Loaded RI Score — **Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 4 out of 100. — **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 residue 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: There are no regulations or rules that pose a significant risk to sawmill and forest residue production and pricing. While declines in forest resource availability that result from a potential ban on logging in Duck Mountain Provincial Park could have modest impacts on some of the other mills in the region (see RI 3.8.3), such a regulatory shift is unlikely to impact roundwood procurement and the availability of forest residue.

Risk is increased by the state of forest management planning and approval processes in Manitoba, which are mired in uncertainty and controversy. In 2006, the government rejected LP's 10-year FMP for FML #3. This did not affect harvesting activity, as LP has continued to submit 2-year operating plans to the Forestry and Peatlands branch for critical review. However, the lack of an approved FMP is likely to affect future harvesting activity. In 2019, LP submitted a 20-year FMP in support of its renewal of FML #3, which remains under review.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed *medium*, therefore the RRL is 6 out of 10.	**6**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed *low*, therefore the RRI is 4 out of 10.	**4**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL × RRI) is 24 out of 100.	**24**

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

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: There is some risk that a portion of the forest resource that is currently available to industry will no longer be available. Logging in the Duck Mountain Provincial Park – which accounts for ~5% of annual roundwood production in the BDO Zone – has recently been scrutinized in a report issued by a BC-based environmental nongovernmental organization (ENGO).[37] The ENGO is politically active in the province. If efforts to ban logging within the Park boundaries are successful, roundwood production could decline by up to 5% without additional harvesting in other areas of the region. This constitutes a relatively low impact on regional sawmill and forest residue availability but is noteworthy. As of March 2024, we assess the risk of logging bans in the Park as low to medium. A large base of regional stakeholders, including First Nations, continue to support sustainable forestry practices in the Park.

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

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

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

[37] https://www.wildernesscommittee.org/sites/default/files/2023-05/Duck-Mountain-Audit-Report-Web.pdf

Risk Information: The forest management planning process in Manitoba requires consultation with First Nations groups. Project proponents are expected to consult directly with the Sapotaweyak Cree Nation,[38] Wuskwi Sipihk First Nation,[39] Minegoziibe Anishinabe, Tootinaowaziibeeng, and other First Nations and Metis communities in the region. It is likely that First Nations engagement will increase under future licensing arrangements.

Risks are heightened by current legal tensions between First Nations, the forest industry, and the government of Manitoba. There are at least 3 active lawsuits that have been brought against industry and government by federal and provincial First Nations groups that pertain to territory and wildlife.[40] It is possible that further lawsuits will be brought against industry and government, potentially limiting wood fibre availability in the long-term. While likely, this is expected to have a low impact on the rated quantity of sawmill and forest residue.

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

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: Not rated.

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**

[38] https://swampycree.com/sapotaweyak-cree-nation-2/
[39] https://swampycree.com/wuskwi-sipihk-first-nation-2/
[40] Based on outreach to local experts.

Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is not rated.	**NR**

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: The majority of productive forests in the BDO Zone are publicly owned and therefore subject to extensive rules and regulations designed to ensure sustainability. The five FMUs in the Mountain Forest Section involve the development of forest management plans, which include an assessment of the sustainable level of harvesting (the Annual Allowable Cut, ACC). Plans are scrutinized by a number of stakeholder groups, including First Nations, government, industry, environmental NGOs, local community groups, and other interested parties. In addition, both SPL and LP are certified under the Sustainability Forestry Initiative (SFI).

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**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**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: Not rated.

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 ((1-Total Notch) × GRI Score) is not rated.	**NR**

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: Not rated.

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 ((1-Total Notch) × GRI Score) is not rated.	**NR**

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: Not rated.

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 ((1-Total Notch) × GRI Score) is not rated.	**NR**

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: Not rated.

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 ((1-Total Notch) × GRI Score) is not rated.	**Score** **NR**

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: Manitoba forest management plans include requirements to monitor vulnerable wildlife species and to avoid harvesting if such species are present. For instance, FML holders must determine whether rare bird species are present in cutblocks before harvesting. Forest companies hire ornithologists to evaluate audio recordings taken in the morning (before harvesting) to ensure no threatened or endangered species are present.

Despite regulations and precautions, there is considerable negative publicity surrounding the issue of the impact of harvesting on wildlife. Moose populations in the region have been declining and have been pictured near forest operations in recent media reports.[41] A report released in 2023 by the Wilderness Committee – a non-profit environmental group – scrutinized logging in the Duck Mountain Forest and received considerable media attention.[42] The group remains active in Manitoba politics. Risk that issues around wildlife will reduce future harvesting is therefore assessed as medium. However, this is unlikely to have an impact on the rated quantities of wood fibre for new projects.

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

[41] https://www.cbc.ca/news/canada/manitoba/wilderness-committee-logging-duck-mountain-provincial-park-1.6831561
[42] https://www.wildernesscommittee.org/DuckMountainAudit

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

3.9.7 Biomass Classified as Genetically Modified Organism (GMO)

Rationale: There are various risks associated with GMOs such as migration or dispersion across the landscape, which can generate community backlash and create supply chain risk. GMOs can also be heavily regulated. If planning to grow or procure GMO feedstocks, especially purpose-grown energy crops, it is important to understand the risks.

Risk Information: Not rated.

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 ((1-Total Notch) × GRI Score) is not rated.	**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: There is no significant risk associated with sawmill residue, as it is a conventional feedstock that is produced and stockpiled in a controlled environment. As noted in Risk Indicator 3.4.3, a new bio-project that requires wood fibre uncontaminated with bark will likely use the 3 DDCs available in the region. Some portion of recovered biomass will be unrecoverable in debarked chip form and therefore tracked grinders will also likely be used to process slash and debris leftover from DDC operations. Generally, these concerns are not likely to impact facility operations as long as procurement managers specify feedstock quality expectations and manage the supply chain accordingly.

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 *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**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: No scale-up is required to produce the rated quantity of sawmill residue. To recover the rated quantity of forest residue with maximization of wood fibre uncontaminated with bark, 1-2 DDCs would be required. An additional 1-2 tracked grinders and 3-4 chip vans/trailers would be required.[43] These equipment demands are already met.

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 *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **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/Ind. District

Risk Information: A +/- 5-acre parcel in Swan River's southern industrial park was chosen to represent some of the infrastructure risk aspects of the area. The site is zoned for heavy industrial development and considered pro-business regarding attracting new industry to the area. The site is undeveloped land with adjoining utilities available, no restrictive

[43] Assumes tracked grinder 20-25 odt/PMH, 5 PMH/day, and 250 working days/year, and chip van 16 odt payload, 2 trips/day, 250 working days/year.

building issues and good access to primary and maintained roads. Risk is elevated due to the relatively small parcel size, which could limit the types of projects that are established. A map of the site and business park is in Appendix C (Map C-4).
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** *RRL Mitigation (Notch)* **NN** No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).
Loaded RI Score **Score** The Loaded RI Score ((1-Total Notch) × GRI Score) is 36 out of 100. **36**

5.1.2 Ownership of Land

Risk Information: The parcel above is currently owned by the city of Swan River and is available for purchase. Current land prices in the area are <$10,000 per acre (~$4,000 / hectare). The site acreage can be expanded or reduced per the new tenant. The ownership is actively promoting the site for new bio-industry opportunities.
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** *RRL Mitigation (Notch)* **NN** No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).
Loaded RI Score **Score** The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100. **16**

5.1.3 Permitting Description

Risk Information: Permitting is required for new construction and utility connections. Time frame is a very standard 30-90 days for most industrial applications. There are no identified building restrictions that would prohibit bio-industry.
Raw Risk Likelihood (RRL) **Score** The risk likelihood is deemed *low*, therefore the RRL is 4 out of 10. **4**

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

5.1.4 Environmental Issues

Risk Information: There were no primary environmental issues found within the industrial site. Air quality in the area is in the "excellent" range. The Swan River has had a history of some industrial contamination but that has been mitigated in recent decades. The lack of environmental issues relevant to infrastructure is a low risk to new bio-economy development within 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 *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **16**

5.2 Risk Factor: Utilities

5.2.1 Natural Gas Availability

Risk Information: Natural gas is available within the Swan River Industrial Park. Managed by Manitoba Hydro there are both distribution (6-12") pipelines and transmission capacity (12"-18") available. As of February 1, 2024, delivered prices in Manitoba are ~12.33 c/m^3.

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

5.2.2 Electric Availability

Risk Information: 97% of Manitoba's energy is produced by renewable sources from within the province (hydro and solar). Manitoba Hydro owns and manages both transmission (115KV+) and distribution lines (12.5KV) within Swan River. These lines have capacity available for new industry as nearly 3% of produced power is exported. This represents a low risk to new industries for availability of power. As of September 1, 2023, industrial electricity rates in Manitoba are some of the lowest in the country, ranging from 3.8-9.8 c/kWh depending on demand class (e.g., small, medium, large).

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

5.2.3 Water Availability

Risk Information: The Town of Swan River Water Treatment Plant (WTP) receives groundwater from three wells located in the northeast corner of Swan River, 40 miles south of Swan River. The Town of Swan River Public Water System provides potable drinking water to a population of 3,964 residents (2016 Census). Treated water produced from the water treatment plant meets all health and aesthetic objectives as stated in the Guidelines for Canadian Drinking Water Quality. The Town's access to three wells and two storage reservoirs ensures sufficient availability of water for new industry.

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

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

5.2.4 Waste Disposal

Risk Information: The Town of Swan River provides full garbage collection services within its city limits, including the industrial areas to the south. The primary landfill is within 15 miles of the town center and accepts limited hazardous waste.

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

5.2.5 Internet Availability

Risk Information: There are four internet service providers in the Swan River area: Shaw, Xplore, MapleWifi and TravelWifi. All can set up either residential or industrial services, wireless or hard-wired. Pricing is competitive and availability is immediate.

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

5.3 Risk Factor: Transportation/Logistics

5.3.1 Road/Highway Access

Risk Information: The Town of Swan River is the northern anchor to Highway #83. It continues south across the U.S. border as U.S. Route 83. Highway #10 provides ready access to northern Manitoba. Swan River also has a well-established road network within its city limits. Some bridges need replacement in forest operating areas, occasionally restricting load size in some areas.

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

5.3.2 Rail Access

Risk Information: Their primary line runs adjacent to the chosen industrial parcel but does not include a rail spur. The nearest freight platform is 1 km to the north. Passenger rail service is not available. Rail freight is available via CN Railroad out of the industrial district of Swan River and connects south to Winnipeg and west to Saskatchewan. This is a full-service freight line providing reliable, and economical options for new industries to the area.

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

5.3.3 Airport Access

Risk Information: Swan River Airport is used by charter services, emergency flights and private / business pilots. The nearest commercial airport is Regina International in Saskatchewan, 4 hours' drive time (360 km), where both Air Canada and WestJet offer multiple flights per day in all directions. This represents a medium-to-high risk to new industries for employee and staff transportation, particularly during the planning and construction phase.

Raw Risk Likelihood (RRL)	**Score**
The risk likelihood is deemed *high*, therefore the RRL is 8 out of 10.	**8**
Raw Risk Impact (RRI)	**Score**
The risk impact is deemed *high*, therefore the RRI is 8 out of 10.	**8**
Gross Risk Indicator (GRI)	**Score**
The Gross Risk Indicator (RRL × RRI) is 64 out of 100.	**64**
Mitigation/Notching	**Notch**
RRL Mitigation (Notch) No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**NN**
Loaded RI Score	**Score**
The Loaded RI Score ((1-Total Notch) × GRI Score) is 64 out of 100.	**64**

5.3.4 Water Freight Access

Risk Information: There is no water freight access within Swan River / Swan Valley, MB. Freight demands are met with road and rail infrastructure.

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

5.4 Risk Factor: Social Infrastructure

5.4.1 Healthcare (Local)

Risk Information: In Swan Valley, residents have access to quality health care through the $33 million regional health facility (opened October 2005) and 11 other local facilities and medical offices. Air ambulance is available to transport emergency patients to centers outside the region, and the Handi-Van service is available for transporting persons within the region.

Other services available include physiotherapy, speech pathology, dialysis, mental health center, and a telehealth link to specialists in Winnipeg.

Several doctors, dentists, optometrists, chiropractors, and other general and specialized healthcare professionals operate offices in the area with additional specialized medical persons coming to the community on a regular basis. For those who like to have health care options, a variety of alternative practitioners are also available.

This coverage represents a low risk to new industries and their staff and employees.

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

5.4.2 Education (Schools)

Risk Information: The public system is free and includes Kindergarten to Grade 12. Private schools are also available, in addition to adult learning and post-secondary options. Public education is under the administration of the Swan Valley

School Division with programming available in English and French Immersion. The Swan Valley Regional High School serves the Swan Valley region and provides a variety of technical courses including information technology, business & management, cosmetology, family & community services, power mechanics, electricity, food services, and environmental studies.

Post-secondary opportunities are offered by a local office under Provincial administration – University College of the North. Courses are offered via video conferencing and also as evening programs. With sufficient interest, full-time day programs may be organized.

eCourses Manitoba offers college-level academics using online accessibility in a wide range of disciplines. An Academy of Learning and Living Word Bible College is also available for post-secondary studies.

This is a very extensive offering of education choices for new industries.

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

5.4.3 Local Transportation

Risk Information: Mahihkan Bus Lines provides transport services from Swan River to Winnipeg for $85 CAD. Local transportation within the city consists of Valley Cabs, Rowe Service Ltd and Handi-Van for medical transport. Note that the industrial site is located 2 miles from the town center.

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

5.4.4 Public Safety (Local)

Risk Information: Between 2018 and 2022, the town has seen a rise in its crime severity index, which measures how much crime is reported and how serious each crime is, according to Statistics Canada data released this summer. At 506 (crimes per 10,000 people), Swan River's index was more than three times higher than Manitoba's in 2022, which was 146. An RCMP detachment is located within the Town of Swan River. This escalated crime statistic is a medium risk to new industries.

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

5.4.5 Housing/Cost of Living

Risk Information: Swan River's cost of living is 16% lower than the Canadian national average. A large component of that index is housing costs in the area, they are 72% lower than the national average. Offsetting are higher utility costs (gas/electric, +120%) and slightly higher food and services costs (108% of national average).

The lower housing cost indicators slightly outweigh the higher ancillary costs in the area.

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

5.5 Risk Factor: Labour

5.5.1 Workforce

Risk Information: The population within the BDO Zone is less than 10,000. The unemployment rates in the municipalities of Swan Valley West and Swan River in 2016 were 3.9% and 5.0%,[44] which was lower than the 2016 national average (7.0%). As of January 2024, Manitoba had the lowest unemployment rate in the country (4.0%).[45]

The area's tremendous forest reserves contribute to more than 600 people employed in this industry through international and regionally based companies (Town of Swan River Annual Report 2023). Key industry participants are Louisiana Pacific (wood panel siding) and Spruce Products Limited (dimensional lumber). Risk is increased slightly by the combination of low population and low unemployment, which may indicate a restricted labour pool for new projects.

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

5.5.2 Labour Costs

Risk Information: The minimum wage in Manitoba is $15.30 per hour as of October 1, 2023, which is 8% lower than neighbouring Ontario. As of January 2024, the average annual salary in Swan River is $40,165. That works out to be

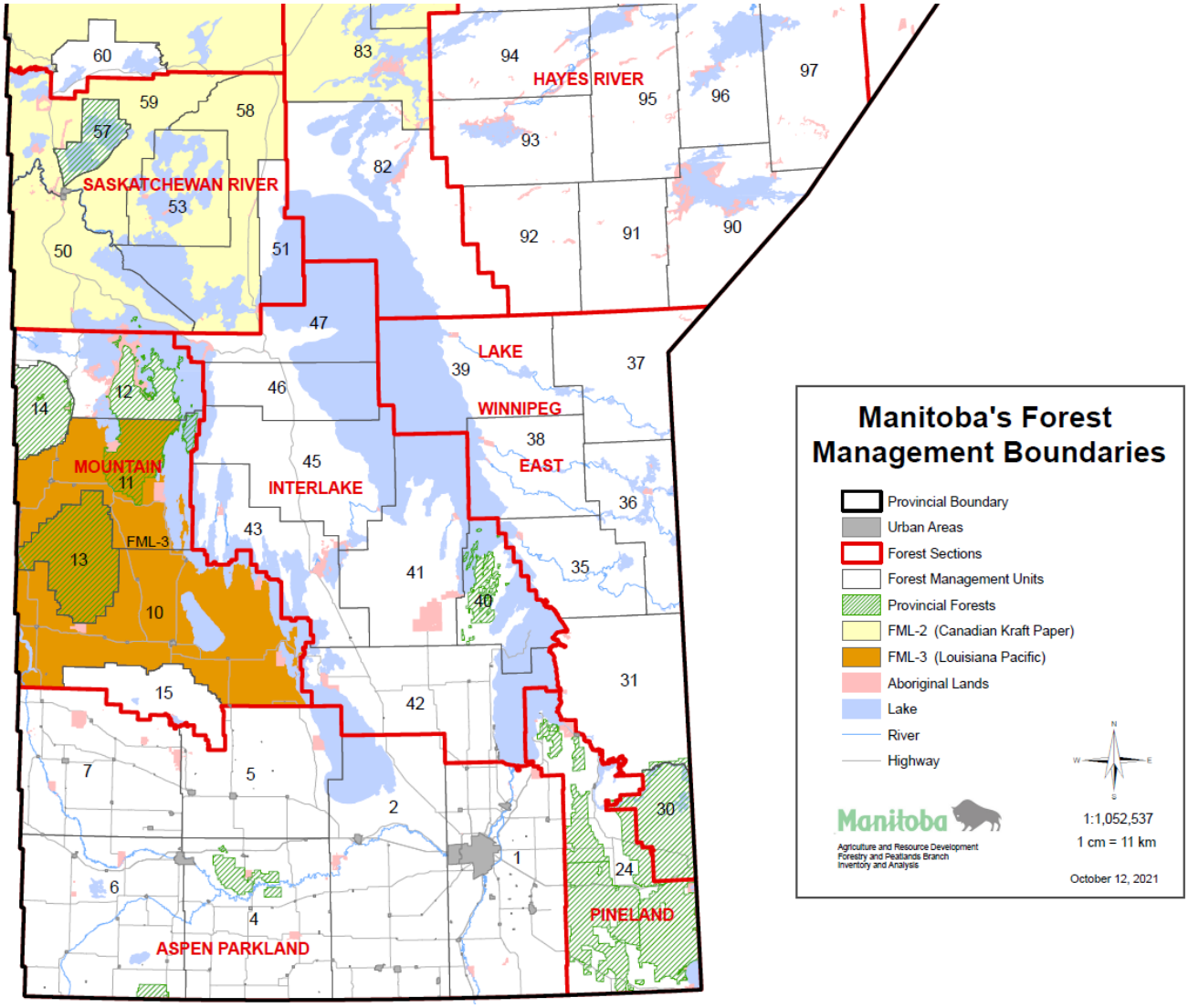
[44] https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/Page.cfm?Lang=E&Geo1=CSD&Code1=4620042&Geo2=POPC&Code2=0911&Data=Count&SearchText=Swan%20River&SearchType=Begins&SearchPR=01&B1=All

[45] https://www.jobbank.gc.ca/trend-analysis/job-market-reports/mb/job-market-snapshot

approximately $19.31 an hour. This is equivalent to $772 a week or $3,347 a month. Most salaries in Swan River range between $30,375 (25th percentile) to $48,208 (75th percentile) annually. This low labour cost is an asset to new industry.	
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 *RRL Mitigation (Notch)* No adjustment. *RRI Mitigation (Notch)* No adjustment. The Total Notch (RRL Notch × RRI Notch) is NN (No Notch).	**Notch** **NN**
Loaded RI Score The Loaded RI Score ((1-Total Notch) × GRI Score) is 16 out of 100.	**Score** **16**

APPENDIX C: TABLES AND FIGURES

Figure C-1. Forest Management Sections and Forest Management Units in south-central Manitoba[46]



[46] https://www.gov.mb.ca/nrnd/forest/pubs/manage/FMU-map-Oct2021.pdf

Figure C-1. Biomass supply curve for a bio-project located in the Town of Swan River

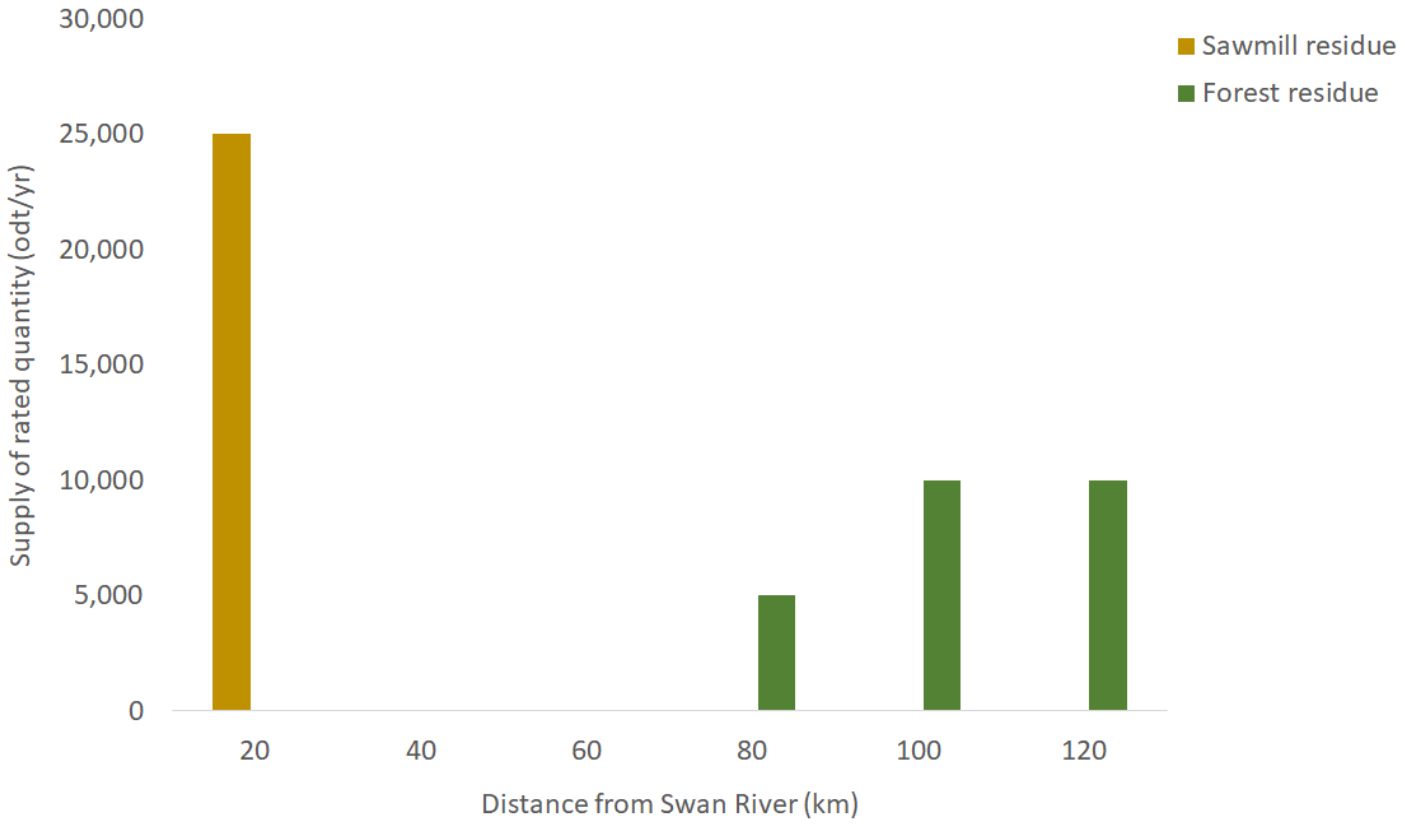
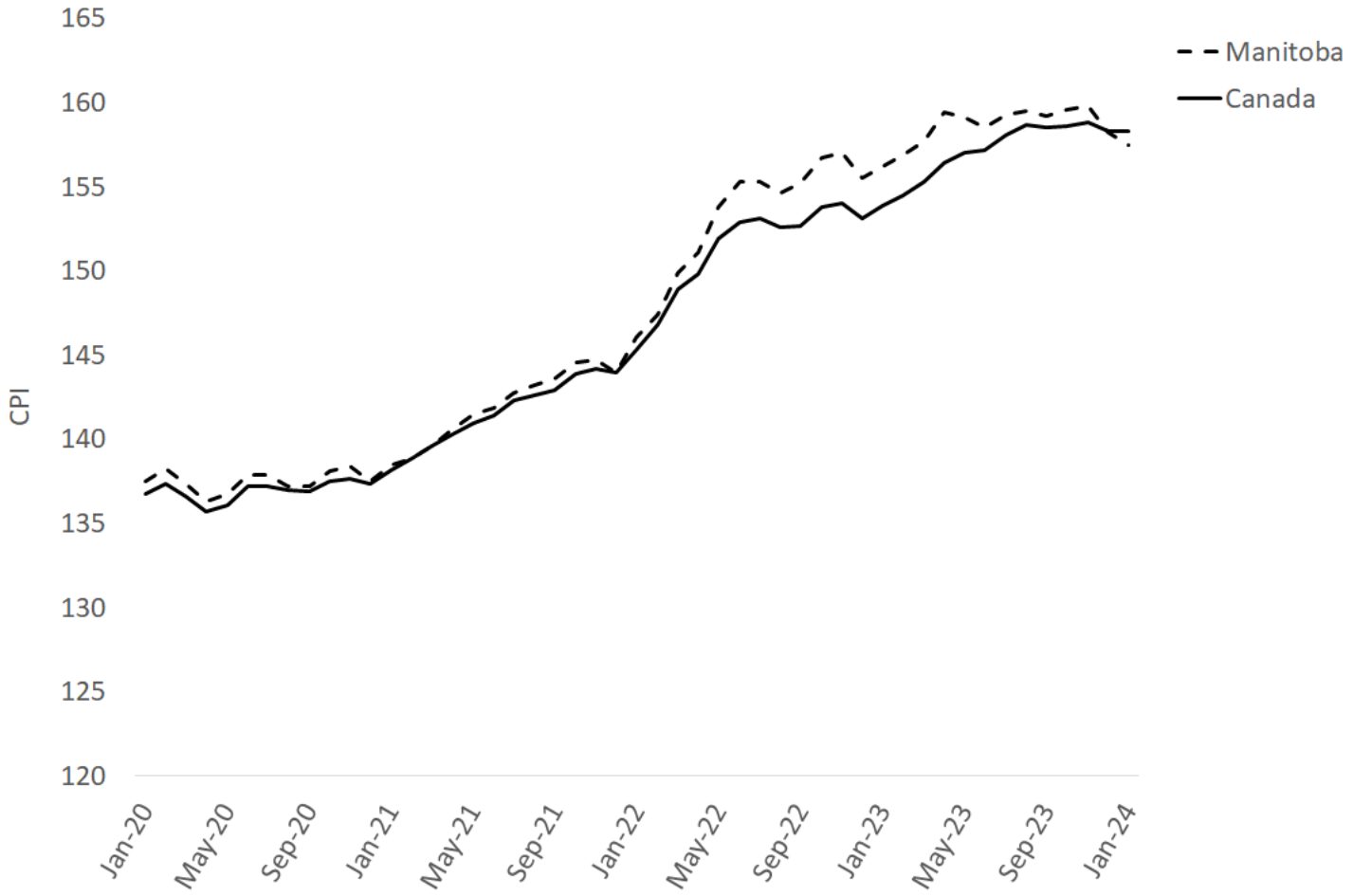
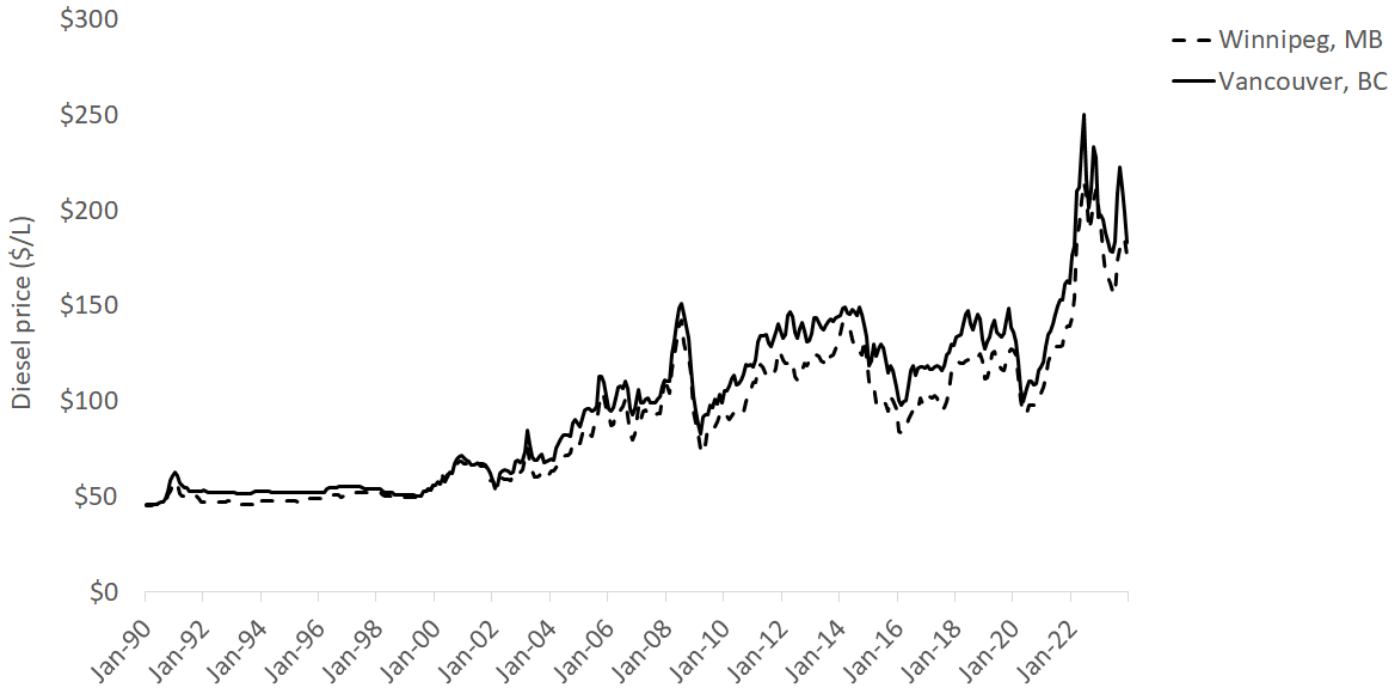


Figure C-2. Comparison of Manitoba and Canada CPI, 2020-2024[47]

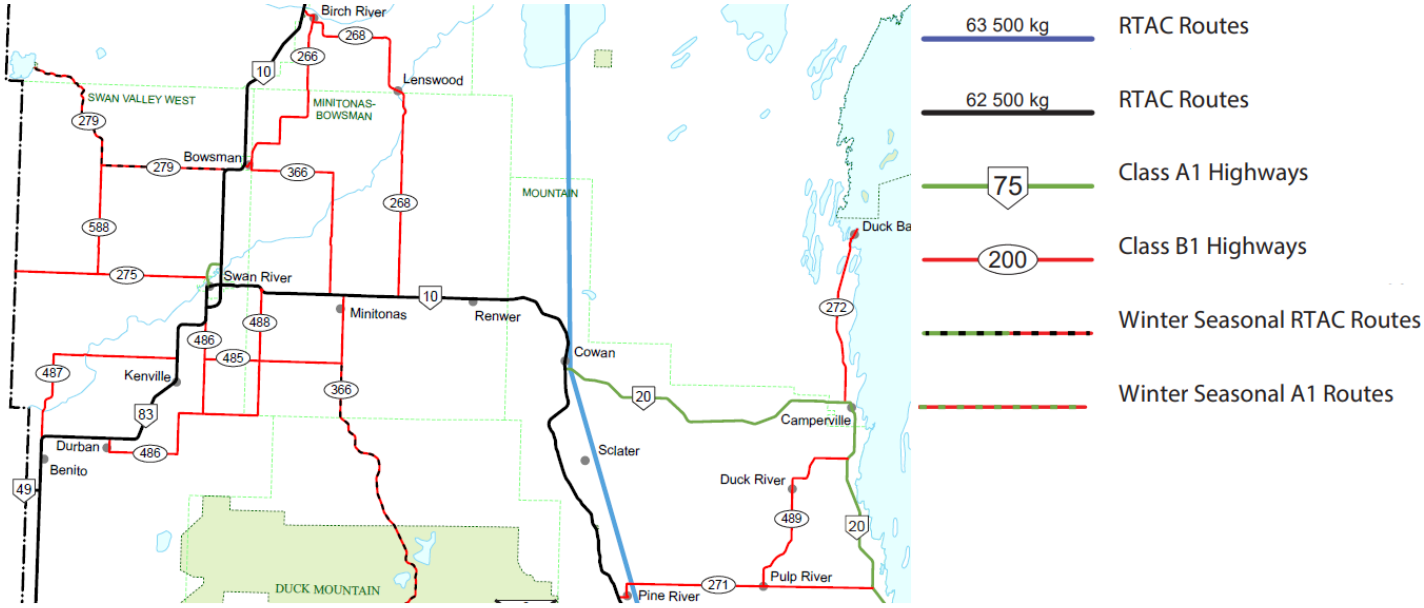


[47] https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810000401

Figure C-3. Nominal diesel prices in Winnipeg, MB and Vancouver, BC, 1990-2023[48]



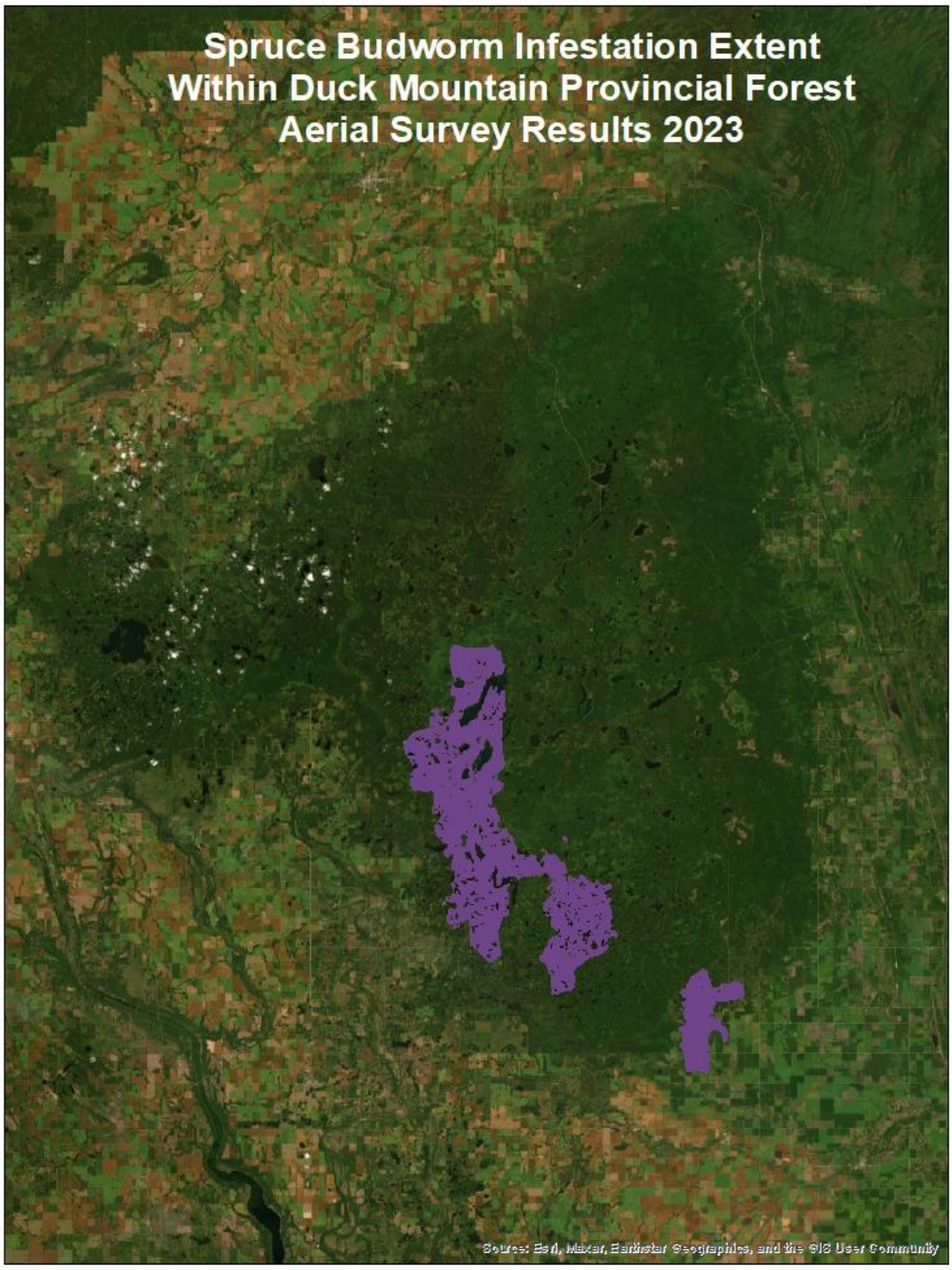
Map C-2. Distribution of RTAC-, A1-, and B1-designated roads in Swan Valley



Source: https://www.gov.mb.ca/mti/mcd/resources/twlm.html

48 https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810000101&pickMembers%5B0%5D=2.6&cubeTimeFrame.startMonth=01&cubeTimeFrame.startYear=2023&cubeTimeFrame.endMonth=01&cubeTimeFrame.endYear=2024&referencePeriods=20230101%2C20240101

Map C-3. Spruce budworm-affected areas in Duck Mountain Provincial Forest[49]



[49] Map provided by the Manitoba Forestry and Peatlands Management Branch.

Map C-4. Location of potential project site in southern Swan River



APPENDIX D: LEGAL DISCLAIMER

This BDO Zone Rating (the "Rating") is prepared for, and provided to, Town of Swan River, 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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