STRATEGIC PLAN TO DEVELOP LABRADOR SECONDARY MANUFACTURING AND VALUE ADDED WOOD PRODUCTS INDUSTRY

Submitted to:

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INTRODUCTION & OVERVIEW

The overall purpose of this assignment was to determine the potential production of dimension and further processed, secondary or 'value added' wood products in central and south-coastal Labrador.

To serve this purpose, this study addressed five key objectives. These were to:

- Define the wood supply to be used by a proposed manufacturing venture.
- Identify and assess the relationships between local stakeholders and the proposed business.
- Identify and evaluate markets which could be served profitably by a Labrador wood products manufacturing business.
- Define the manufacturing complex that can effectively and profitably meet the needs of identified potential market opportunities.
- Develop a business plan / operational model for the proposed business.

As we commenced the project in mid-summer 2006, Abitibi-Consolidated announced unexpectedly the complete shut down of its newsprint mill in Stephenville, NL. The announcement changed several basic economic parameters as well as the potential scope of manufacturing operations that could be considered by the consulting team.

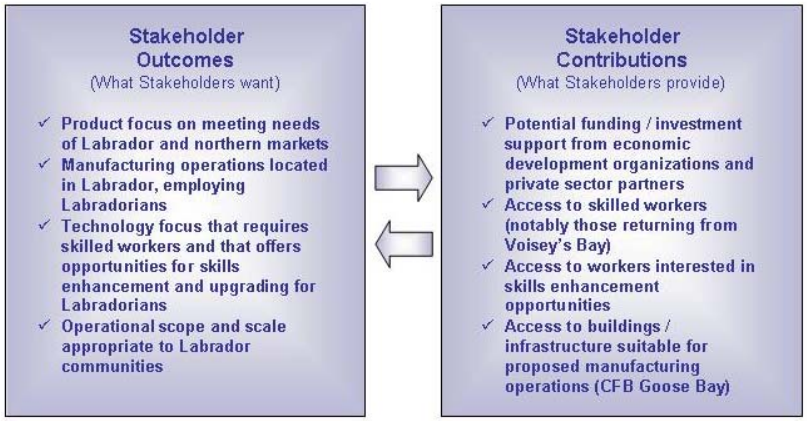
STAKEHOLDER CONSULTATIONS & RELATIONSHIPS

More than 80 stakeholders were consulted in individual and group sessions during visits to Central Labrador (Happy Valley – Goose Bay area) and the Southern Labrador Coast, (Cartwright to the Straits area). There was considerable consistency in the views expressed with regard to a basic set of expectations that are held with respect to future secondary manufacturing of value added wood products in Labrador, as well as with regard to the contributions stakeholders can make towards the success of the venture.

These expectations and contributions constitute the relationship that will exist between the proposed venture and stakeholders.

This relationship is summarised in the following schematic.

Stakeholder Relationships



STRATEGIC CONSTRAINTS

Our research also identified a number of significant strategic constraints that impose significant limitations on the nature, scope and scale of secondary wood products manufacturing operations that can be considered for Labrador. These constraints include:

- **Overall Total Available Timber Supply** – Available timber supply, (slightly less than 300,000 m^3 in the three Forest Management Districts that were the focus of this study), is insufficient to support any large scale industrial forest products operation.

- **Timber Supply – Coast & Central Labrador** – The study focused on three Forest Management Districts – FMD 19, 20 & 21. The total AAC in FMD 19 is 198,600 m^3, of which more than two thirds (141,900 m^3) is located south of the Churchill River and will not be accessible until completion of a bridge crossing, anticipated for the 2006 construction season. Licenses to harvest the remainder of the AAC which lies north of the river have been issued.

  In District 20, approximately 25,000 m^3 of timber has not been allocated to issued licenses and is available for licensing / harvesting. In District 21, calculation of the AAC is under review, but licenses have been issued for the full volume of the calculated cut in the previous planning period (49,000 m^3).

- **Timber Supply – Quality Issues** – There is a significant incidence of moderate to extreme degrees of spiral grain occurring in black spruce harvested in all three

management districts. This characteristic of the timber can create quality and recovery challenges, particularly if manufacturing equipment used is inappropriate. The potential for the incidence of spiral grain to influence significantly selection of manufacturing technology and products to be produced dictated that further analysis of this characteristic was warranted. The test results show spiral grain is manageable, but is nonetheless a constraint on total available supply.

- **Distance To Market –** Any wood products manufacturing operation established in Labrador must either produce value added products that generate sufficient margin to overcome the freight cost penalty imposed by distance to market, or focus on local or other markets in which it will be possible to take advantage of the 'cost cushion' provided by distance to import from other producers.

- **Energy Supplies –** Electricity supply in Central Labrador is limited because the transmission line from Churchill Falls is very nearly at capacity, and there is no excess supply of electricity in the coastal communities in which manufacturing capacity might be established. Any proposed manufacturing operation must be developed to be energy-self-sufficient or nearly so.

- **Limited Markets For Residual Products –** The absence of readily available markets for mill residuals – chips, sawdust, shaving and bark – dictates that a key operating parameter for any proposed facility must be total utilization of harvested fibre.

PROPOSED BUSINESS STRATEGY

The stakeholder consultation process yielded four key strategies that form the basis of a potential secondary wood products manufacturing operation that would be feasible within the set of strategic constraints identified during the consultations and from our research.

These strategies are --

- A manufacturing operation with capacity limited to / focused on meeting the housing needs of the local (Labrador) market plus markets in northern territories;

- An operation that uses integrated manufacturing functions that maximise value from fibre and ensure total utilization of fibre;

- A manufacturing operation that is designed for maximum work flow and work force flexibility; and,

- A manufacturing operation that is designed to be as close to energy self-sufficiency as practicable.

When implemented in a functioning operation, the strategies will result in the production of 'housing kits' designed to be shipped as complete sets of components and sub-system assemblies ready for quick assembly on site at final destination.

OPERATIONS REQUIREMENTS

To ensure the proposed venture has appropriate operational capacities to support effective execution of the strategies, key *operating* elements required include:

- Manufacturing technology with flexibility for use in production of multiple products / work steps;
- Access to timber supply and adequate harvesting capacity to meet volume needs of the facility;
- Manufacturing / processing operations to ensure use made of total fibre supply; and,
- Marketing / sales functions appropriate to particular needs of local and northern territory markets.

PEOPLE REQUIREMENTS

To ensure the proposed venture is staffed with people having the appropriate skills and capabilities to support effective execution of the strategies, key *people* elements required include:

- Executive leadership and management team skilled and experienced in flexible manufacturing operations;
- Workforce skilled and flexible for facility that combines both advanced and basic technologies;
- Marketing / sales team skilled in developing complex business relationships; and,
- Internal work force training capabilities to ensure workers able to work in maximum number of work cells.

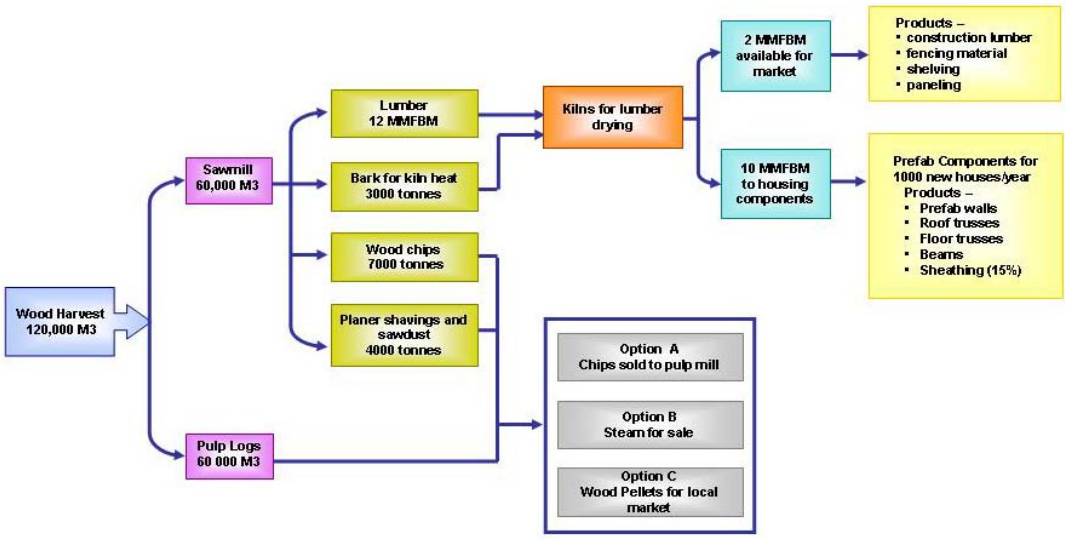
PROPOSED MANUFACTURING PLAN

The proposed manufacturing plan is based on supplying local and northern markets with a comprehensive line of products for housing construction. This includes construction grade lumber as well as engineered solid wood products and value added components. Some of these products are to be offered as an alternative to materials that must be otherwise imported from distant suppliers. The intent is to manufacture as many different house components as possible in order that a complete package of structural components can be assembled. Plant capacity has been designed to produce and assemble approximately 1,000 house kits per year, on a two-shift basis.

Conceptually, the plan consists of:

- A sawmill operation that would produce structural grade lumber and the primary material for the remaining components;
- An assembly operation to produce engineered products, including floor trusses, wall panels, roof trusses, beams, wall sheathing, and roof sheathing; and,
- A value added manufacturing operation to produce such components as flooring material, wall panelling and shelving.

The following schematic provides an overview of the manufacturing plan.



Total anticipated capital costs for the entire operation are summarised in the following table.

CAPITAL ITEM	ESTIMATED COST
Sawmill (Manufacturing Equipment)	$ 3,500,000
Mobile Equipment (3 machines – eg. loaders / forklifts)	450,000
Kilns & Boiler (150 hp)	$ 925,000
Planer / Moulding	$680,000
MSR Equipment	150,000
Roof Truss Manufacturing	850,000
Floor Truss Manufacturing	50,000
Beam Production (Glulam)	100,000
Wall & Roof Sheathing, fencing or panelling	-----
Parts Inventory	160,000
Total Capital Cost – Wood Processing Operation	**$ 6,865,000**
Pulp & Residual Fibre Processing Option 1	
Waste System	
300 hp boiler (if installed replaces kiln boiler @ $500K)	$ 1,100,000
1,500 hp boiler (burn pulp logs)	$ 2,500,000
Pulp & Residual Fibre Processing Option 2	
Pellet Plant	
Configuration Option 1	1,250,000
Configuration Option 2 (extended operation)	1,250,000
Configuration Option 3	2,500,000
Dust Extraction	150,000
Overall Project Contingency Estimate	$ 1,000,000
Total Estimated Capital Costs (Depending on Options)	**$ 8,265,000** **or $ 9,965,000**

We have anticipated that the sawmill will eventually operate year-round on a two shift basis. A start-up period and a period of operating on one shift have been incorporated into the financial model for the proposed venture.

During the project we learned that suitable buildings suitable may be available on CFB Goose Bay at nominal or limited cost. Therefore, we have not included any costs for building or for site preparation and services in this capital estimate.

However, if such base buildings prove to be unavailable, capital cost estimates will increase by $ 4,550,000 to allow for construction of three structures – sawmill - $ 1.7 million; secondary processing facility - $2.5 million; and, pellet plant - $ 0.35 million. Site preparation and services costs could also add significantly to this total.

Estimated manufacturing employment at the facility, based on a one-shift operation, is summarised in the following table.

Operating Function	Estimated Workforce
Sawmill (Including log yard)	16
Kilns & Boiler	**
Value Added Facility	
Planer / Moulding	4
MSR Equipment	**
Roof Truss Manufacturing - Operators	9
Roof Truss Manufacturing – Drawing Technicians	2
Floor Truss Manufacturing	1
Beam Production (Glulam)	2
Wall & Roof Sheathing, fencing or panelling	**
Waste System	**
Pellet Plant	**
Total Estimated Workforce Requirements	34

Total manufacturing workforce requirements will approximately double when two-shift operation begins. A management team of four, plus one support staff has also been incorporated into the financial model.

MANUFACTURING PRODUCTION UNITS & WORK CELLS

Sawmill

To meet the projected production requirement it is estimated that annual sawmill production of 12 million fbm will be required. Achievement of this volume of sawn wood output requires input of approximately 60,000 m3 of saw logs per year. The production per shift would be 25,000 fbm on a two shift basis.

Lumber Drying

Lumber produced must be dried to 12% moisture content because a significant portion of the material will be used in manufacturing engineered wood products. Two kilns of 60,000 fbm each are recommended to facilitate the flexibility in drying schedules that will be required to meet the lower moisture content specifications for several of the secondary and engineered products.

Lumber Planing

Lumber planing will be carried out using a moulder, which will also be used for finishing and profiling of panel products.

Floor Trusses

Open floor trusses will be manufactured from 2"x 3" and 2"x 4" lumber, using pre-manufactured steel plates at the connections. The subcomponents would be pre-cut at a separate work cell that included in the roof truss work cell unit.

Beams

Beams will be produced for use as main floor supports in the housing units. These items will be designed to replace 2"x 8", 2"x 10" and 2"x 12" solid wood joists which cannot be manufactured in sufficient volume by the sawmill, given the anticipated size of timber that will be available locally.

Wall Panels

Wall panels will be assembled on framing tables. Five or six such tables will be required to produce sufficient capacity for targeted output. Tables can be built locally and added as demand increases.

Roof Trusses

Roof trusses are an engineered product that must be assembled with a high degree pf precision to ensure required strength properties can be met. To ensure appropriate capacity and quality control, use of advanced equipment such as semi automated angle saws, lasers lines, computer based production controls, semi automated tables is recommended.

Wall and Roof Sheathing

Plywood and OSB sheets are commonly used as sheathing material in most residential construction markets. However, because there is no readily available local supply of these panel products, 1"x 6" tongue-and-groove boards can be manufactured for this application.

PROPOSED MARKETS

The markets which are proposed to be served by the value added manufactured and composite products along with the construction grade lumber include the local market in Labrador (which includes the Straits area, Happy Valley Goose Bay Region, Labrador City Region and the coastal communities in Labrador) and the northern national market, specifically Nunavut.

Local Market in Labrador

The proposed manufacturing operation will have capacity to supply the local market with as much as 2 million fbm of construction grade lumber annually. This volume can effectively offset supplies currently being transported into the area from Québec and centres further west and will likely result in somewhat lower pricing of graded lumber in the local market. Annual demand for construction lumber in the local market is typically in the range of approximately 3 million fbm annually.

National Northern Market, Nunavut

More than 3,000 Public Housing units are needed in Nunavut to reduce overcrowding and enable Territory resident to enjoy housing space and standards similar to the rest of Canada. Another 1,000 units require renovation and an additional 2,700 Public Housing Units will be required to address growth in communities over the next 10 years .

FIBRE RESOURCE

As background to this study, it is noted that a forestry agreement was reached between the Province of Newfoundland and Labrador and the Labrador Métis Nation. A deliverable

negotiated within that agreement was for a feasibility study "into the value-added and secondary forest products in Labrador in conjunction with local stakeholders".

The resource base considered in this agreement includes the management areas both north and south of the Churchill River known as FMD 19. The annual allowable cut has been determined net of set-asides (after adjustments for non-timber management issues and domestic harvest allocations). In addition, the scope of this study was extended to include FMD 20 and FMD 21, respectively the Cartwright and Port Hope Simpson areas of the Southern Labrador Coast.

The total Annual Allowable Cut in the three Forest Management Districts which comprise the study area is summarised in the following table;

Forest Management District	AAC (m^3)
District 19 – North of Churchill River	*56,700*
District 19 – South of Churchill River	*141,900*
Total District 19	198,600
District 20	30,000
District 21	49,000
Totals	277,600

Source: Newfoundland & Labrador Department of Natural Resources

OTHER RESOURCE RELATED ISSUES

The absence of a direct linkage in legislation or regulation between processing capacity for which mill licenses are issued and timber allocations for which harvesting licenses are issued creates situations in which development of forest products industries can be constrained. The prevailing practice of matching allocated Annual Allowable Cut harvest licenses to the apparent licensed 'processing capacity' for which commercial mill licenses have been issued, regardless of whether the allocated harvest amount is in fact supplying licensed processing capacity, can be as a significant limitation on the development of new forest-based businesses.

The absence of Crown authority to direct the flow of fibre from a harvest license to a processing mill, also creates a situation in which the harvest license holder could potentially, in effect, hold a processing mill to ransom and demand a premium price for Crown timber.

This approach to licensing can also create a significant risk to continued success of viable processing operations. By investing in process improvements and new technology which

result in greater throughput capacity and mill productivity, successful mills could easily create a situation in which the effective capacity of licensed mills increases beyond the AAC available to feed the mills.

We are not aware of such practices and circumstances existing anywhere else in Canada; and, we suggest this approach to timber allocation is a potential constraint on development of the forest products industries in Newfoundland and Labrador. A more direct, transparent and clearly articulated linkage between licensing of processing mills, (including the timber consumption requirements inherent in those mills), and licensing of the timber harvesting needed to support those mills would be helpful to all participants in the forest products sector.

Business Plan / Operational Model

Before the proposed manufacturing plan can be made operational a number of organizational, governance and management issues will need to be addressed by the venture proponents . These will include:

- Development of a relationship with a supplier that can supply the non-wood building products and materials needed to complete the housing kits;
- Development and implementation of an approach to staging, assembly and shipping of the kits to destination markets;
- Development of relationships with contracting firms with capabilities to create appropriate foundations for the housing and to undertake final assembly of kits on site at customer locations; and,
- Development of effective working relationships with the housing authorities and similar agencies in northern territories and communities that represent potential clients for the proposed venture.

Start-Up / Implementation Issues

We have identified issues that will need to be resolved / addressed before operations can begin successfully. These include:

- Identification of investor proponents to lead the proposed venture;

- Recruitment of a senior management team with the mandate bring the business into operation;
- Identification, selection and securing of an appropriate site and building for the venture;
- Determination of energy supply arrangements;
- Securing appropriate timber harvest licensing arrangements and contracting / employment of adequate harvesting capacity;
- Identification of and development of relationships with organizations with expertise in the building materials supply chain and in staging and assembly functions; and,
- Establishment and development of sales-focused relationships with Labrador and northern territory housing organizations that are prospective clients of the venture.

CAPITALIZATION & FINANCIAL SUMMARY

The capital investment required for the venture is approximately $8.5 – $9.5 million, depending on options chosen for waste treatment and energy production. In addition, another $4.55 million capital will be needed if buildings need to be constructed for the venture; and, capital will be required to cover approximately $2.0 million in losses expected during the start-up period.

Thus, total capitalization of the venture will be approximately $11.5 million exclusive of buildings, and approximately $16.0 million if construction of buildings is required.

When fully operational on a two-shift basis, the venture can be expected to generate approximately $18.0 million in revenues, incur direct and indirect expenses of approximately $13.1 million and generate an operating surplus of $4.9 million, (assuming building construction is not required.)

1. INTRODUCTION – THE CONTEXT FOR DEVELOPMENT

OVERVIEW & APPROACH

The overall purpose of this assignment was to determine the potential for further development of the Labrador sawmill industry to produce dimension and further processed, secondary or 'value added' products at various possible manufacturing locations in central, (Goose Bay area), and south-coastal Labrador.

To serve this purpose, this study addressed five key objectives. These were to:

- Define the wood supply that can be utilised by a dimension and secondary wood products manufacturing facility or facilities in Labrador.
- Identify and assess the relationships between local stakeholders and the proposed wood products manufacturing venture.
- Identify and evaluate markets for dimension lumber and secondary / value-added wood products which could be served profitably from a manufacturing facility or facilities situated in various Labrador locations.
- Define a sawmill / secondary wood products manufacturing complex or complexes that can effectively and profitably produce those products for which potentially profitable market opportunities have been identified.
- Develop a business plan / operational model for the proposed facility / facilities.

Our planning approach started with developing an understanding of the economic relationships that would likely exist between various stakeholders and any proposed wood products manufacturing operation in Labrador. Concurrent with the stakeholder consultation process we also conducted research to identify the major strategic constraints and parameters which would define the boundaries within which a wood products manufacturing business would have to operate.

Once Stakeholder relationships and significant constraints were defined, we began establishing the strategy or business model through which both stakeholder needs and the economic requirements of the venture would be satisfied. The strategy is supported by operations requirements (- capacities) and people requirements (– skills & capabilities), which we combine in a comprehensive strategy map which defines the proposed venture.

STAKEHOLDER EXPECTATIONS, CONTRIBUTIONS & OUTCOMES

During visits to both Happy Valley – Goose Bay and the Southern Labrador Coast – (Cartwright, Port Hope Simpson, Charlottetown, Mary's Harbour, and Straits-area communities), we consulted with more than 80 stakeholders in individual and group sessions. The stakeholder groups and interests consulted are summarised in the following schematic.

Stakeholder Map

Many of the individuals and organizations consulted graciously provided us with access to information, studies, reports and other data and responded to supplemental questions on multiple occasions. We are grateful for their help and support.

A wide range of views, concerns and expectations were identified during these discussions.

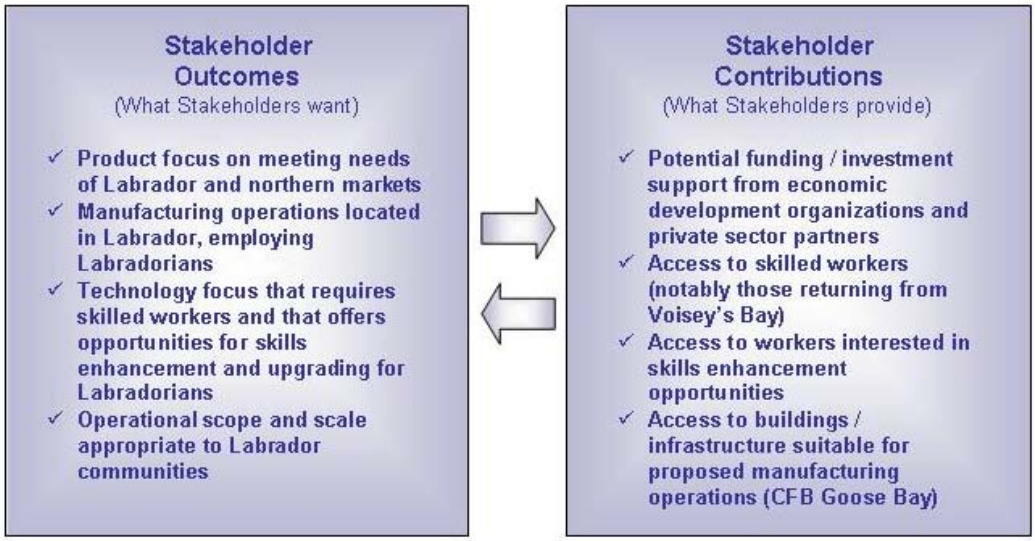
However, as our work on the project commenced in mid-summer 2006, Abitibi-Consolidated announced unexpectedly the complete shut down of its newsprint mill in Stephenville, NL. The uncertainty created by the Abitibi announcement dominated much of the discussion with stakeholders.

The Stephenville mill was, at the time, a major consumer of pulpwood harvested in Labrador, receiving annual shipments of approximately 75,000 m^3 of softwood from the area in most years. The viability of at least one existing forest sector operator, a logging contractor in Happy Valley – Goose Bay, was largely dependent on Abitibi pulp wood purchases, placing some 35 jobs at risk. For other operators on the Southern Labrador Coast, the discontinuation of pulpwood purchases by Abitibi represented a loss of significant revenue and related logging activity that would have the impact of effectively increasing costs of harvesting logs to supply sawmill operations.

As well, the announcement changed the basic economic parameters and potential scope of the secondary manufacturing operations that could be considered by the consulting team. The impacts of these changes will be discussed in more detail later in this document.

However, there was considerable consistency throughout the consultations, both in Central Labrador and on the Coast, with regard to a basic set of expectations that are held with respect to future secondary manufacturing of value added wood products in Labrador, as well as with regard to the contributions stakeholders can make towards the success of the venture.

These expectations and contributions constitute the relationship that will exist between the proposed venture and stakeholders. This relationship is summarised in the following schematic.



STRATEGIC CONSIDERATIONS & ISSUES

During the course of the consultations and research conducted for this project, we identified a number of significant strategic constraints that impose significant limitations on the nature, scope and scale of secondary wood products manufacturing operations that can be considered for Labrador. These constraints are discussed in the following paragraphs.

Available Timber Supply -- Overall

In Forest Management Districts 19, 20 & 21 the total aggregate Annual Allowable Cut available for industrial use is slightly less than 300,000 m^3. Assuming all this timber was accessible and available to supply a single manufacturing operation – *an assumption we recognise is not valid* – it would be impossible to sustain either a sawmill or a pulp and paper mill that would be considered economically viable by current industry standards and norms.

For example, if the total wood supply in the three Districts, (approximately 300,000 m^3), consisted of sound logs that were processed initially through a modern, highly efficient sawmill, the sawn lumber yield would be approximately 50 – 55% (150,000 – 160,000 m^3 on a solid measured basis or roughly 65 million fbm). This level of output represents only about one tenth the production of the newest, largest sawmills operating in Western Canada and elsewhere.

From an alternative perspective, if we assumed the entire Annual Allowable Cut in all three Districts (300,000 m^3) were harvested and processed as pulp wood, the total volume would meet less than 10% of the raw material requirements of the newest, largest pulp mills being built in the world today.

Of course, these conversion assumptions also ignore issues of timber quality and accessibility, both of which represent significant strategic constraints in any consideration of opportunities for processing Labrador timber, as will be discussed further in a later section of this document.

Our purpose in providing these examples, however, is simply to illustrate to readers that the available wood supply, in its entirety, is insufficient to support *any large scale industrial forest products operation*. Therefore, we have not considered such facilities as viable options in this study

The limited volume of available timber supply also creates financial implications with respect to the limits on capital investment that can reasonably be considered.

If we again assume the total available timber supply consists of high quality timber, processed in an efficient manufacturing facility, operating under the most positive possible business conditions in which various forest products are being sold into robust markets at profitable prices – *assumptions that must be viewed sceptically in today's conditions* -- the financial return generated would be unlikely to exceed net margins of more than CAD 6 – 8 / m^3 of harvested timber.

Thus, even under highly positive, (and unrealistic), operating assumptions, the *total* Labrador timber supply will be unlikely to generate an aggregate operating profit of more than CAD 2 – 2.5 million in operating profit from a facility producing some combination of sawn softwood lumber and furnish for pulp manufacturing. If we assume this level of profitability represents a targeted return on capital employed (ROCE) of approximately 15%, the example suggests the (optimistic) potential return from the total wood supply will support up to $15 - $20 million in total capital investment.

The conclusion we have drawn from this estimate and incorporated into our analysis is that the available timber supply places an upper limit of approximately $20 million in capital investment in wood products manufacturing that can be supported in all of Labrador.

Therefore, in summary, the available timber supply dictates in terms of both output volume and supportable investment that any manufacturing operation to be considered must be small scale.

Available Timber Supply – Coast and Central Labrador

The Terms of Reference for this project defined the scope of our study as being limited to Forest Management Districts 19 (Central Labrador), 20 (Cartwright area) & 21 (Port Hope Simpson and Southern Coast).

In District 19 there is an Annual Allowable Cut of 198,600 m^3 located outside of protected areas.

More than two thirds (141,900 m^3) of the Annual Allowable Cut in District 19 lies south of the Churchill River and will not be accessible for industrial harvest until completion of a bridge crossing, anticipated for the 2006 construction season. The extent to which this timber supply will be accessible will also be constrained by construction of Phase 3 of the Trans-Labrador Highway and the need for subsequent construction of woods access roads.

The remainder of the District 19 Allowable Cut (56,700 m^3) lies to the north of the Churchill River. As described in more detail later in this document, licenses to harvest this entire volume have been issued by the Province.

In District 20, approximately 15 – 20% (5,000 m^3) the total Allowable Cut of 30,000 m^3 is allocated to existing license holders. A process to solicit proposals for the remaining supply (25,000 m^3) was underway concurrently with this study. A small portion of this incremental timber supply can be accessed from the newly constructed eastern extension of the Phase 3 Trans-Labrador Highway, however, another two seasons of highway construction, followed by access road construction, will be required before that supply will be fully accessible.

It should also be noted that as construction of Phase III the Trans Labrador Highway progresses, access to the westernmost areas of FMD 19 will be facilitated and a forest inventory in that area can be completed. There is potential that inventory could identify additional commercial forest areas that will increase the AAC in FMD 19 above the current volume of 30,000 m^3.

In District 21, (Port Hope Simpson and south), calculation of the Annual Allowable Cut is under review as part of the Province's ongoing forest management planning process. Calculated at 49,000 m^3 in the previous planning period, licenses to harvest virtually all that volume of Annual Allowable Cut have been issued by the Province.

The volumes of available and unlicensed Allowable Cut in Districts 20 and 21 – essentially the incremental supply of 25,000 m^3 of timber in the District 20 for which proposals are being solicited – places significant limitations on the size and scope of additional manufacturing operations which can be considered for these areas.

Based on the reported experience of existing operators in both Districts, it is reasonable to assume that at least 50% of the available timber will be suitable only for use as pulp or fuel wood. Therefore, measured as potential lumber output , the incremental timber supply can be expected to yield approximately 2.5 – 3.0 million fbm.

This incremental timber supply could be sufficient to support establishment of a few small scale sawmills cutting to meet lumber requirements in nearby communities and, as well, to provide access to timber that could support limited expansion of one or two existing commercial operations.

Subsequent to completion of Phase 3 of the Trans-Labrador Highway from Paradise River to Goose Bay, there may be some potential for mills in Coastal communities to supply sawn products as input to a manufacturing operation in Happy Valley - Goose Bay. Products that could potentially be manufactured on the coast could include tongued and grooved flooring or sheathing boards, laminating blanks and the like. However, we would note that for such value added production to be viable, existing sawmill operators would almost certainly need to invest in and operate jointly a small dry kiln and a moulder to ensure that products manufactured were able to meet the moisture content and other manufacturing quality standards required by a manufacturer customer.

However, the viability of such activity would be dependent on freight costs for the small volumes of lumber that could be supplied.

Available Timber Supply – Quality Issues

During the early stages of our research for this project, we learned that there is a significant incidence of spiral grain occurring in black spruce harvested in all three Forest Management Districts under consideration. Anecdotal evidence suggested that in some harvest areas the incidence could be as frequent as occurring in as many as two-thirds of the logs harvested, with a very high percentage of logs exhibiting moderate to extreme degrees of spiral grain.

We also encountered other anecdotal evidence to suggest that some sawmill operators, both in Labrador and Newfoundland, have experienced significant quality and recovery challenges processing spiral grained Labrador wood.

This information was important because the spiral grain characteristic of the wood supply could dictate, or certainly limit choices of manufacturing technology to be used. Under some

circumstances, the spiral grain characteristic could also limit the range of products that can be manufactured effectively.

Given these findings, it became apparent that development of reasonably accurate grade and volume recovery estimates would not be possible without more detailed testing of the impacts of spiral grain. Therefore, with the support and participation of the Department of Natural Resources and the Newfoundland & Labrador Forestry Training Association, a sample of logs was harvested in District 19 and transported to Newfoundland for sawing and drying under controlled conditions.

The results of that testing process are reported in more detail in the appendices to this report. As well, the results have also been taken into account in our raw material supply estimates for the proposed manufacturing operations, as well as in our selection of proposed manufacturing technology and of products to be produced.

From a strategic perspective, the incidence of spiral grain is a manageable but further constraint on the supply of timber available to support secondary manufacturing operations.

Distance To Market

Happy Valley – Goose Bay is approximately 1,500 km by road from the northeastern edge of the North American building products markets. That freight haul distance represents a cost penalty of approximately CAD 125 – 150 / M fbm for sawn softwood lumber. A manufacturing facility located in Central Labrador would have to achieve significant efficiencies and economies of scale to have any hope of overcoming such a cost disadvantage.

The limitations of available timber supply discussed in the preceding section demonstrate clearly that there is insufficient timber volume to support manufacturing operations that could potentially achieve efficiencies needed to produce sawn softwood lumber profitably for the North American lumber market.

On the other hand, the distance from market also creates for a Labrador-based manufacturer a 'cost cushion' of CAD 125 – 150 / M fbm (for softwood lumber) that can offset the higher conversion and operating costs that are likely to accompany a smaller scale manufacturing operation.

Distance to market dictates that any facility manufacturing for export from Labrador to North American or even other markets must produce value added products that generate sufficient margins to overcome the shipping cost penalty. However, the volume and quality

of available timber supply make it unlikely that any such products could be produced in volumes adequate to support profitable operations.

Therefore, the most appropriate strategic approach is to focus on manufacturing to meet the needs of local or other markets by taking advantage of the 'cost cushion' provided by the distance from market and from other producers .

Energy Supplies

The Happy Valley – Goose Bay area is supplied with electricity from Churchill Falls along a 135 KV transmission line. Energy distribution is handled through a 55 MW step down transformer at the Goose Bay Terminus of the transmission line.

According to municipal, military base and Newfoundland and Labrador Hydro officials, electricity consumption in Happy Valley – Goose Bay is very nearly at capacity of the transmission line.

Efforts have been underway for some time to bring about an upgrade to expand capacity of the transmission line from Churchill Falls; however, no specific commitments to implement the upgrade have been forthcoming.

In Coastal communities, except in the southernmost Straits area, electricity is generated by diesel plants operated by Newfoundland and Labrador Hydro. There is no excess supply of electricity in any of the communities in which wood products manufacturing operations might be established.

Within the context of the prevailing energy supply situation, any proposed manufacturing operation must be developed to be as close to energy self-sufficient as practicable.

Limited Markets For Residual Products

Conventional operating and market arrangements in the wood products industries typically involve a sawmill producing wood chips that are sold to a pulp mill, as well as sawdust and shavings that are sold to a manufacturer of a composite panel product such as particleboard or medium density fibre board. It is the revenues generated from residual sales that generally ensure the profitability of the sawmill.

The limitations on scale of manufacturing that are dictated by the parameters of available wood supply in Labrador also create a further constraint in that volumes of available timber are also insufficient to support a pulp mill or other manufacturing consumer of mill residues. Thus a local buyer for mill residues does not exist, nor is it likely that such a buyer could be established profitably.

With current (and past) sawmill operations in Labrador, slabs produced from canting of logs are sold as fuel wood, while sawdust and shavings have generally been handled as landfill on the mill site. Markets for slabs can be viable for sawmills, especially in coastal communities, however, it is not clear that a relatively larger manufacturing facility operating in Happy Valley – Goose Bay could find sufficient buyers for the volumes of slabs that would be produced.

Handling other residues as landfill is environmentally harmful and in contravention of Provincial statutes and regulations.

Therefore, a key strategic operating parameter for any proposed manufacturing facility will be that total fibre consumption will be essential. That is, environmentally acceptable uses must be found for 100 per cent of the fibre harvested to for use in the facility.

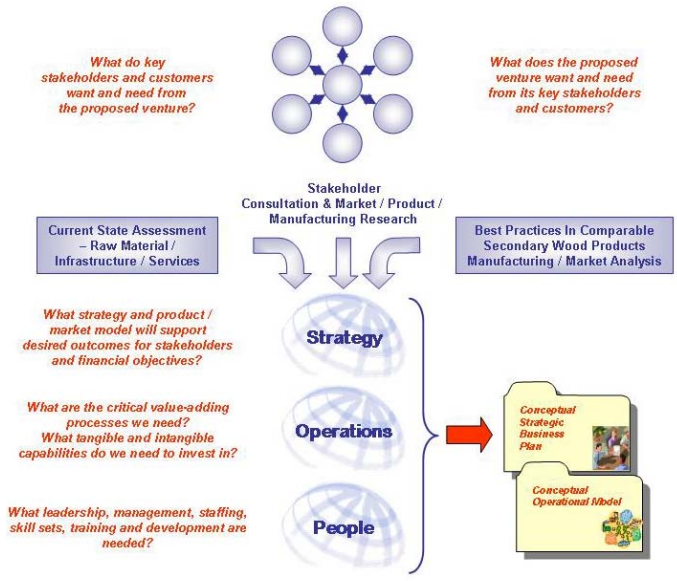
2. STRATEGY FOR WOOD PRODUCTS MANUFACTURING IN LABRADOR

STRATEGY FORMULATION PROCESS - INTRODUCTION

As explained in Chapter 1, our planning and strategy formulation process is founded on a detailed understanding of the economic relationships that can be expected to exist between various stakeholders and any proposed wood products manufacturing operation in Labrador. Our planning process starts with extensive stakeholder consultations, supplemented with research to identify major strategic constraints and parameters.

From there, we establish the strategy or business model through which both stakeholder needs and the economic requirements of the venture would be satisfied. The strategy is supported by operations requirements (- capacities) and people requirements (– skills & capabilities), which we combine in a comprehensive strategy map which defines the proposed venture.

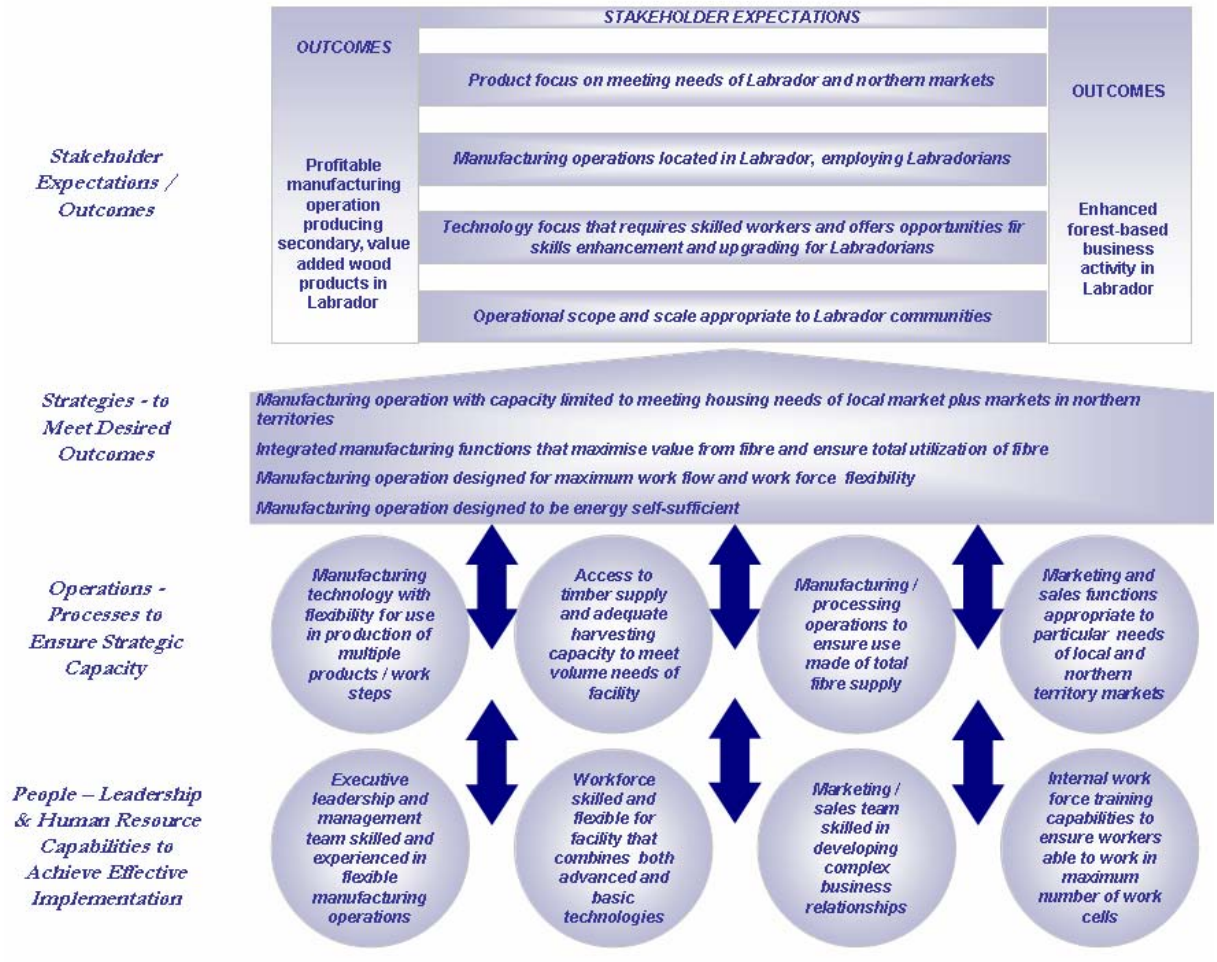
The key directions of the strategy, however, are fundamentally defined by the expected outcomes and planned contributions of stakeholders as these are articulated during the consultation phase of the project. The following schematic provides an overview of the planning process used to develop the proposed strategic approach.



STRATEGY MAP - OVERVIEW

The strategy map schematic shown below illustrates the alignment and integration required for effective implementation of strategies that will meet the expectations articulated by stakeholders in a secondary, value wood products industry in Labrador.

Strategy Map - Labrador Secondary Wood Products Manufacturing Complex



MANUFACTURING STRATEGIES

As shown in the strategy map presented on the previous page, the stakeholder consultation process yielded four key strategies that would together form the basis of a secondary wood products manufacturing operation that would both meet the expectations of stakeholders and be feasible within the set of strategic constraints identified during the consultations and from our research.

These strategies are --

- A manufacturing operation with capacity limited to / focused on meeting the housing needs of the local (Labrador) market plus markets in northern territories;
- An operation that uses integrated manufacturing functions that maximise value from fibre and ensure total utilization of fibre;
- A manufacturing operation that is designed for maximum work flow and work force flexibility; and,
- A manufacturing operation that is designed to be energy self-sufficient.

When implemented in a functioning operation, the strategies will result in the production of 'housing kits' designed to be shipped as complete sets of components and sub-system assemblies ready for quick assembly on site at final destination.

OPERATIONS REQUIREMENTS

To ensure the proposed venture has appropriate capacities to support effective execution of the strategies, key elements of the *Operations Sphere* that were identified as being required include:

Details of the manufacturing elements of the proposed venture are discussed in more detail in Chapter 3, Proposed Manufacturing Plan. However, some discussion of the strategic business implications of the required components of the Operations Sphere is warranted here.

Manufacturing technology with flexibility for use in production of multiple products / work steps.

The discussion of the overall strategic constraints within which this proposed manufacturing business must be developed clearly shows that overall scale must be relatively small and total output volumes limited to the needs of identified target local and northern markets. As well, capital investment must be kept to a level that fits within the scope of the returns that can potentially be generated from the operation.

As well, as the manufacturing plan will describe in more detail, there will be a number of product components manufactured at various work steps in the operation that can be produced on a single machine.

Therefore, to ensure an appropriate level of investment for the scale of the operation, it will be important the manufacturing equipment selected be sufficiently flexible, in terms of both function and location, to support production of multiple products for different stages of the operation.

Access to timber supply and adequate harvesting capacity to meet volume needs of the facility.

The manufacturing plan anticipates total annual timber input requirements of approximately 120,000 m^3. Given the geographic distribution of the available Annual Allowable Cut, a very large percentage of the timber supply needed to support the operation will have to be sourced from harvest areas in Forest Management District 19 located south of the Churchill River.

Start up of the operation will therefore be dependent on completion of the bridge crossing of the Churchill River – anticipated during the 2006 construction season – and on availability of appropriate access roads to approved harvest areas. We understand that access roads to gravel supplies developed for construction of the Trans Labrador Highway could serve as the beginning of an access road network. Therefore, neither the bridge nor the access road requirements should have material impact on potential timing of start-up for the proposed venture.

The other aspect of "access to timber" that must be taken into account is haul distance from the harvest to the mill site. The potential availability of suitable buildings on CFB Goose Bay, and the proximity of the base to the Trans Labrador Highway and Churchill River bridge crossing suggest the timber access requirement can be readily addressed by locating the facility on the base.

Manufacturing / processing operations to ensure use made of total fibre supply.

The absence of a viable market for both pulp grade logs and for mill outputs that could serve as pulp mill furnish – i.e. wood chips, and shavings – creates a potential constraint that could result in prohibitively high raw material costs, such that the proposed venture would almost certainly not be viable.

Disposal of wood wastes in landfill is also unacceptable because of the significant detrimental impacts on the environment, particularly with respect to ground water resources and nearby water bodies.

As well, the limitations on potential energy supply available to support the operation essentially dictate that energy self-sufficiency be an integral component of the venture if it is to be successful.

Therefore, the proposed operation will incorporate energy production processes that will ensure use of the total fibre inputs to the complex.

Marketing / sales functions appropriate to particular needs of local and northern territory markets.

Much of the market demand the proposed operation will attempt to meet will be housing constructed under the aegis of a corporate or public sector organization. Corporate purchasers will most likely be resource companies creating town sites at a resource development, (eg. Voisey's Bay), or sponsoring construction of homes in existing communities for employees and their families moving to an area from elsewhere in connection with a major project.

Public sector purchasers will most likely be housing authorities and similar organizations that are agencies of a territorial government, either aboriginal or non-aboriginal. These organizations may be located in Labrador, in Canada's northern territories or elsewhere. (For example, at the time of writing of this report, an advertisement was published in the Globe and Mail by the building association of the Greenland Home Rule Government seeking proposals for system built (self-builder) housing.)

For the venture to experience sales success meeting these types of housing needs, the operation's marketing and sales functions will need to be effective in developing productive relationships with corporate and public sector customers. As well, the relationship development capabilities will also need to be applied to establishment of productive and cooperative alliances with Federal, Provincial and Aboriginal governments and related

agencies, as well as with other economic and community development groups which may be either customers or sponsors supporting sales efforts outside Labrador.

PEOPLE REQUIREMENTS

To ensure the proposed venture is staffed with appropriate skills and capabilities to support effective execution of the strategies, key elements of the *People Sphere* that were identified as being required include:

Details of the operational staffing of the proposed venture are discussed in more detail in Chapter 3, Proposed Manufacturing Plan. However, some discussion of the strategic business implications of the required components of the People Sphere is warranted here.

Executive leadership and management team skilled and experienced in flexible manufacturing operations.

The products to be manufactured by the proposed venture will be varied and include –

- basic commodity lumber;
- tongued and grooved boards;
- glued panels, and structural members such as beams and headers;
- engineered components such as floor and roof truss sets; as well as,
- assembled building system components such as roof, wall and floor panel assemblies.

As well, the need for energy self-sufficiency means that an operation to process sawmill residuals into fuel must also be managed as part of the complex.

The relatively small scale of the operation, however, requires that the facility be organised into a variety of work cell areas to produce particular components required for the housing kit assemblies. While it is anticipated that some of the individual machines will incorporate relatively sophisticated technology, there is limited reliance on automated material handling. Assembly functions are also based on manually loaded jigs.

The combination of advanced technology machines with manual and lower technology material handling and assembly functions will require an executive and management team skilled at leading and managing an operation that demands a very high level of flexibility and adaptability of everyone involved.

The business focus on selling and producing housing kits for customers who will in many cases be located some distance from the plant will also demand a leadership and management focus on quality assurance and production to meet seasonal shipment deadlines and commitments to customers.

The findings from our research suggest these needed skills are likely to be in short supply in Labrador. We therefore anticipate that efforts will be required to recruit appropriate expertise from elsewhere to launch the venture successfully and to ensure effective skills development and capacity building within the local work force.

We also note that the requirements for customer focus, quality assurance and delivery to deadlines will extend back to suppliers such as other sawmill and component producers. Meeting these needs will place demands on these operations they have not previously experienced and will likely create a requirement for management skills development support for these businesses, as well.

Workforce skilled and flexible for facility that combines both advanced and basic technologies.

The operation will place a high premium on worker flexibility and adaptability. Workers involved in the component production and assembly in particular will likely need to perform both manual material handling tasks as well as operate machines such as routers, glue lines, and the like.

The log handling, sawmill and residual processing operations will require relatively conventional roles, including sawyers, lumber graders, heavy equipment and other machine operators.

As noted in the Central Labrador Forest Industries Labour Market Assessment recently completed by the Labrador North Chamber of Commerce, there is a limited supply of workers trained in the manufacturing functions. Therefore, skills development efforts will be required to ensure an appropriately trained work force is available to meet the needs of the operation.

It should also be noted that a number of the specific products / components to be manufactured by the venture will be required to meet building code and other technical specifications. In particular, engineered components such as trusses and structural panel assemblies will be required to meet stringent technical and quality requirements. Therefore, the operation will require at least one qualified engineer, (who could be part of the management team), and likely two engineering technicians qualified to oversee production of trusses and panel assemblies.

Marketing / sales team skilled in developing complex business relationships.

As noted in the discussion of required marketing and sales functions within the Operations Sphere, we anticipate that many, if not all of the customers for the output from the venture will be organizations, such as Aboriginal housing agencies.

The sales process for selling to such organizations is complex, requiring development of multiple relationships with individuals involved in the customer organizations in many different roles. (These roles will at a minimum include: the technical buyer who defines the specifications; the financial buyer who defines the budget and price; the user who will likely be an operating manager with the agency; and, other key purchase influencers such as community leaders and elders, as well as community members who will ultimately live in the homes.)

The sales team will require skills at managing complex relationships through sales processes that are likely to be of extended duration and involve competitive tendering.

Marketing expertise will also be required to ensure that prospective customers are fully aware of the venture and its products and capabilities.

Internal work force training capabilities to ensure workers able to work in maximum number of work cells.

The inherent flexibility of the proposed manufacturing operations suggests that significant training efforts will need to be undertaken during the first several years of operation to ensure that as many workers as possible are trained to work in multiple work cells. As the business grows and is successful, a need for increased skill levels can also be anticipated.

Some training needs can be met using resources from external organizations, (eg. College of the North Atlantic). However, the continuing requirement for worker training suggests that internal training capabilities will an essential requirement for success of the proposed venture.

3. PROPOSED MANUFACTURING PLAN

OVERVIEW

The proposed manufacturing plan is based on supplying local and northern markets with a comprehensive line of products for housing construction. This includes construction grade lumber as well as engineered solid wood products and value added components. Some of these products are to be offered as an alternative to materials that must be otherwise imported from distant suppliers. The intent is to manufacture as many different house components as possible in order that a complete package of structural components can be assembled

Conceptually, the plan consists of:

- A sawmill operation that would produce structural grade lumber and the primary material for the remaining components;
- An assembly operation to produce engineered products, including floor trusses, wall panels, roof trusses, beams, wall sheathing, and roof sheathing;
- A value added manufacturing operation to produce such components as flooring material, wall panelling and shelving.

Total anticipated capital costs for the entire operation are summarised in the following table.

CAPITAL ITEM	ESTIMATED COST
Sawmill (Manufacturing Equipment)	$ 3,500,000
Mobile Equipment (3 machines – eg. loaders / forklifts)	450,000
Kilns & Boiler (150 hp)	$ 925,000
Planer / Moulding	$680,000
MSR Equipment	150,000
Roof Truss Manufacturing	850,000
Floor Truss Manufacturing	50,000
Beam Production (Glulam)	100,000
Wall & Roof Sheathing, fencing or panelling	-----
Parts Inventory	160,000
Total Capital Cost – Wood Processing Operation	**$ 6,865,000**
Pulp & Residual Fibre Processing Option 1	
Waste System	
300 hp boiler (if installed replaces kiln boiler @ $500K)	$ 1,100,000
1,500 hp boiler (burn pulp logs)	$ 2,500,000
Pulp & Residual Fibre Processing Option 2	
Pellet Plant	
Configuration Option 1	1,250,000
Configuration Option 2 (extended operation)	1,250,000
Configuration Option 3	2,500,000
Dust Extraction	150,000
Overall Project Contingency Estimate	$ 1,000,000
Total Estimated Capital Costs (Depending on Options)	**$ 8,265,000** **or $ 9,965,000**

During the research for this project we learned that buildings suitable for the proposed operation may be available on CFB Goose Bay at nominal or very limited cost to the proposed venture. Therefore, we have not included any costs for building or for site preparation and services in this capital estimate. However, if such base buildings prove to be unavailable, capital cost estimates will increase by $ 4,550,000 to allow for construction of

three structures – sawmill - $ 1.7 million; secondary processing facility - $2.5 million; and, pellet plant - $ 0.35 million. Site preparation and services costs could also add significantly to this total.

Operations will be organised around independent work cells, each of which produces a specific secondary products or component.

The production capacity of the total operation has been designed conceptually to produce material required for the equivalent of approximately 1,000 houses per year. Each house is assumed to be single story of 1,400 square feet without a garage. Additional capacity has been incorporated into the conceptual design so that output can be sold locally to supply the home renovation market as well.

We have anticipated that the sawmill will operate year-round on a two shift basis. However, it may be more practical to begin operating on one shift until market has been developed to a level that supports two-shift production. Estimated manufacturing employment at the facility, (single shift basis), is summarised in the following table.

Operating Function	Estimated Workforce
Sawmill (Including log yard)	16
Kilns & Boiler	**
Value Added Facility	
Planer / Moulding	4
MSR Equipment	**
Roof Truss Manufacturing - Operators	9
Roof Truss Manufacturing – Drawing Technicians	2
Floor Truss Manufacturing	1
Beam Production (Glulam)	2
Wall & Roof Sheathing, fencing or panelling	**
Waste System	**
Pellet Plant	**
Total Estimated Workforce Requirements	34

A management team of four plus one support staff is anticipated and appropriate costs have been incorporated into the financial model.

Subcomponent production will be organised to generate output proportionate to the requirements of housing units being produced. Each work cell would be designed to meet the required production using the appropriate low capital cost equipment. Some equipment would be shared between work cells. Small work crews could move from one work cell to another depending on product orders.

Some products such as roof trusses and a assembled wall panels are customized products and would be manufactured on an 'as-ordered' basis. Standardised items such as sheathing, beams, panels and trusses would be manufactured to meet seasonal inventory requirements using an appropriate control system such as Kenban.

The production hours for each individual work cell could vary from one to five days per week. As demand increased for the subcomponents, additional crews could be added to the individual work cells. Similarly work crews could be reduced during the winter season due to lower demands on certain products.

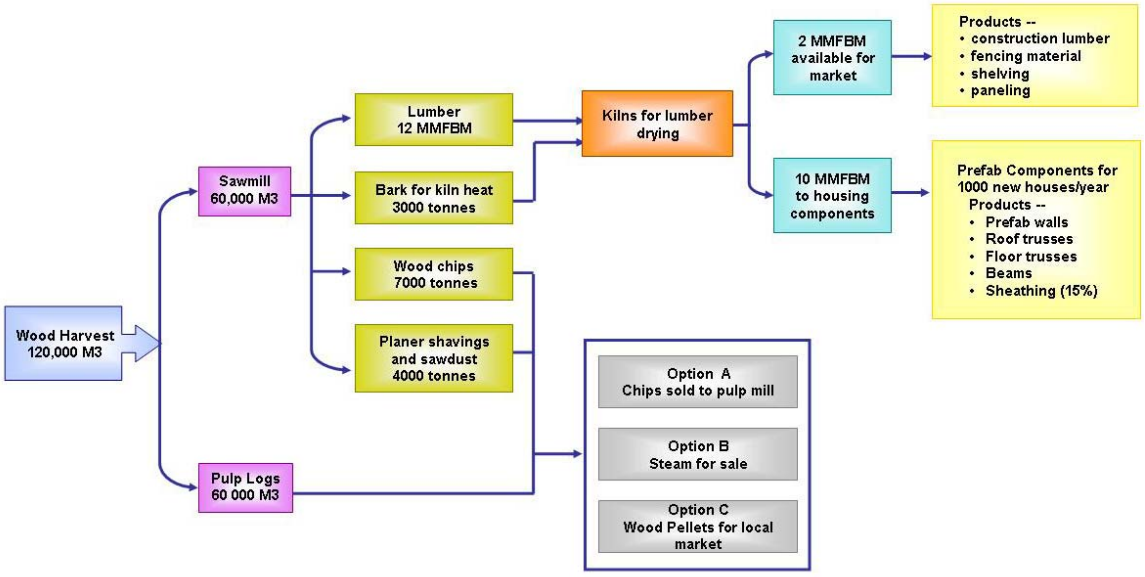
Initially, the overall operation has been designed for single shift operation, expanding to two shifts as market demand increases beyond 500 houses per year. This increase will be reflected in the financial model for the complex.

Manufacturing flexibility to vary product output as dictated by demand will be an essential element of the success of the proposed complex. An ability to produce complete package orders helps offset higher production costs that will be experienced on some items, while offering convenience and value to clients that would otherwise be required to purchase various products from multiple (lowest cost) producers.

The various manufacturing processes and related equipment that have been proposed for use in the facility have been selected specifically for simplicity of operation, maintenance and management. These choices were made in full recognition that an experienced manufacturing work force is not readily available in the local area. However, as experience is gained and markets developed, there will be opportunity to improve productivity through capital investment in more sophisticated equipment.

The schematic on the following page illustrates the anticipated production volume flows through the facility.

Conceptual Manufacturing Plan



The following paragraphs set out, in approximate terms, for each production unit the throughput volumes and equipment descriptions on which the plan has been based. A possible site plan for the complex is included in Appendix C.

MANUFACTURING PRODUCTION UNITS & WORK CELLS

Sawmill

In order to meet the annual projected production requirement for 1,000 house units plus additional output for sale into renovation applications, it is estimated that annual sawmill production of 12 million fbm will be required. Achievement of this volume of sawn wood output requires input of approximately 60,000 m^3 of saw logs per year. The production per shift would be 25,000 fbm on a two shift basis.

The major equipment appropriate for this type of production will include:

- ring debarker,
- sharp chain twin,
- combination edger, horizontal resaw, and,
- green chain.

The budgeted equipment cost, including installation will be $4 million, exclusive of building.

Principle products to be produced will include:

- 2″x 6″,
- 2″x 4″,
- 2″x 3″,
- 1″ boards, and
- specialty dimensions as required for component stock.

The sawing patterns would be tailored according to volumes required for each of the different products.

Lumber Drying

Lumber produced must be dried to 12% moisture content because a significant portion of the material will be used in manufacturing engineered wood products.

Two kilns of 60,000 fbm each are recommended to facilitate the flexibility in drying schedules that will be required to meet the lower moisture content specifications for several of the secondary and engineered products. To minimise initial capital costs, one kiln can be installed for start-up, while the second kiln need not be installed until a second production shift is required.

However, once installed, both kilns would operate 24 hours per day.

The energy source for the kilns will be bark removed from the logs at the sawmill. The capital cost per kiln is $150,000 and the cost for the bark burning 150 HP boiler is $500,000 that would be sufficient for the two kilns and the heating of buildings as well.

Lumber Planing

Lumber planing will be carried out using a moulder, which will also be used for finishing and profiling of panel products. Projected capital cost is $700,000.

This production function requires operation for only one shift for two sawmill shifts. Thus, if the sawmill operates on a one shift, five day week basis, the planer/moulder need only operate two and a half days per week.

In this situation, the production crew will be available to operate another work cell during the balance of the week.

Floor Trusses

Open floor trusses will be manufactured from 2"x 3" and 2"x 4" lumber, using pre-manufactured steel plates at the connections.

We have considered but rejected the manufacture of wood I-joists because webstock material, (OSB), is not available locally. As well, quality control issues frequently encountered during start-up and operations with webstock OSB can be difficult to manage when the webstock supplier is located a considerable distance from the I-Joist production facility.

The floor truss work cell will consist of a single manual press system. The budgeted capital cost will be $50,000. This cell will operate five days per week on two shifts.

The subcomponents would be pre-cut at a separate work cell that included in the roof truss work cell unit.

Beams

Beams will be produced for use as main floor supports in the housing units. These items will be designed to replace 2"x 8", 2"x 10" and 2"x 12" solid wood joists which cannot be manufactured in sufficient volume by the sawmill, given the anticipated size of timber that will be available locally.

The beams would be fabricated to 3" nominal width in various depths. The beams would be used in multiples as required and will be very similar to glulam beams in their assembly.

Equipment required for beam production will include:

- a series of manual clamp stations; and,
- a semi-automated glue system.

Capital costs for equipment sufficient to manufacture beams required for 1,000 houses per year has been estimated at $100,000.

This work cell will operate on a one-shift basis.

Wall Panels

Wall panels will be assembled on framing tables at a budgeted cost of $15,000 each. Five or six such tables will be required to produce sufficient panels for 1,000 houses per year.

However, the tables can be built locally and added as demand increases.

An alternative is to install a semi-automated wall panel assembly line at a capital cost of $500,000. This investment would significantly reduce labour and skill requirements from that required for the manual production approach using framing tables.

It is recommended that plant layout provide for eventual installation of an automated wall panel assembly line.

Exterior wall panels will incorporate wood and sheathing material produced on site, thereby achieving significant cost savings.

Roof Trusses

Roof trusses are an engineered product that must be assembled with a high degree pf precision to ensure required strength properties can be met.

To ensure appropriate capacity and quality control, use of advanced equipment such as semi automated angle saws, lasers lines, computer based production controls, semi automated tables is recommended.

The conceptual design also includes a secondary table for production of smaller trusses.

Operation of the truss work cell, will be on a two-shift basis.

Capital costs are estimated at $800,000. However, it should be noted that some of the equipment included in this estimate will also be used in production of floor truss and wall components.

As well, this operating unit will have capacity and capability to produce trusses that will meet the needs of local, commercial and industrial construction markets.

Wall and Roof Sheathing

Plywood and OSB sheets are commonly used as sheathing material in most residential construction markets. However, because there is no readily available local supply of these panel products, 1″x 6″ tongue-and-groove boards can be manufactured for this application.

The material will be manufactured from 1″x 6″ boards, or by resawing 2″x 6″ combined with processing through the moulder to produce the tongue-and-groove pattern and appropriate surface finish.

As a result, capital costs are already captured in the equipment for the lumber planing work cell.

There are also opportunities with this work cell to explore the potential for production of alternative products. These could include:

- Other dimensions, such as narrower or wider boards;
- Use of non-standard dimensions that may be practical because of log sizes and sawing patterns;
- Production of sheathing 'panels' through application of adhesives or nails to combine multiple pieces of tongue-and-grooved materials to create a larger assembly, (eg. combining four pieces of 1″ x 6″ to create a 1″x 24″ sheathing 'panel').

  Use of such 'panels' could significantly offset the higher labour costs that would be associated with use of individual boards in house or panel assembly.

ADDITIONAL MANUFACTURING OPTIONS

Other Finished Products

The lumber we have seen during the course of the study and related log quality testing is characterised by small. tight knots, which can create a desirable appearance for a number of finished products. Examples could include:

- Wainscot-style wall panelling using a tongue-and-groove design.

  Production of a product of this type would require proper drying to ensure appropriate moisture content levels, (8 – 10%), as well as sorting the desired pieces for processing through the moulder.

  The potential for flexibility and production of even small volumes of alternative products of this nature provides further illustration of the benefits from use of a moulder, rather than a conventional planer, that can also meet the planing needs of the sawmill. The capital cost of the moulder is included elsewhere, but an additional capital allowance of $50 000 should included here to provide for a strapper and wrapping system for packaging the finished products.

- Shelving or other edge-glued panels used in a variety of applications.

  Production equipment required would include the moulder, the beam clamp system, as well as an additional 18" shop-type planer. Incremental capital cost for the planer will be $10 000.

- Rustique-type flooring.

  This type of product could be manufactured merely through additional sorting and processing through the moulder. No additional equipment would be required.

- Full size cants, solid wood panels, beams and rough sawn lumber used in the mining industry and park walkways may also have potential as small volume products which can be sold in local markets.

WASTE UTILIZATION

The sawmill and related operations will generate various types of residue including bark, sawdust, chips, and planer shavings. Several uses for this material exist and mainly require additional capital investment. Although such uses may be economically marginal, landfill disposal is unacceptable because "there is clear scientific evidence that, if improperly managed, wood residue can negatively impact the environment, contaminate water and destroy fish habitat."[1]

The majority of the bark produced can be used as the energy source for the boiler and generate the heat required for the kilns and the buildings. The amount of bark that will be generated from the sawmill is likely to exceed the volume required for usable heat energy. However, the remaining bark will also be burned, recognising that excess heat will be released into the atmosphere. The boiler size required will be approximately 150 HP.

The sawdust and planer shavings can also be used to generate heat. Other uses can be for animal bedding, but demand for such material is quite limited. There is interest from CFB Goose Bay in purchasing heat in the form of steam. The combined excess bark, sawdust and planer shavings could therefore be used to generate steam that would provide additional energy that could be consumed by the base year round.

An alternative could be to convert the waste material into wood pellets to be consumed in appropriately designed wood stoves. However, the volume of pellets generated would be insufficient as an economically viable supply for export markets; but, pellets could be consumed locally, assuming an adequate customer base of wood pellet stove users was available.

Normally, wood chips produced by a sawmill are sold to a local pulp mill or paper mill. Since such sales are unlikely to be possible from a sawmill in central Labrador, the chips produced could also be used to generate heat for CFB Goose Bay.

When combined with other wood waste, the chips would provide sufficient fuel for an additional 150HP of energy that could be consumed on a year-round basis by the base.

Alternatively, the chips could be used to increase the production of wood pellets.

[1] Ontario Ministry of the Environment, Fact Sheet on Wood Waste, available at http://www.ene.gov.on.ca/envision/land/woodwaste/woodwastefs.htm ; readers may also want to review other documents on this subject, a list of references for which is also published by the Ontario Ministry of the Environment and is available at http://www.ene.gov.on.ca/envision/land/woodwaste/woodwastefsref.htm .

PULP LOGS

A significant volume of the logs that will be harvested will be of insufficient size to be used by the sawmill. Unfortunately, there is no current, accurate data on which to base a precise estimate of the actual percentage of saw logs that can be harvested from the wood basket . However, anecdotal evidence provided by local operators and foresters and supplemented by on-site observation by the consulting team suggests that saw logs will not represent more than 50% of the harvest.

It should also be noted here that the distinction between pulp and saw mill fibre can be a function of the technology employed in the sawmill, combined with the forest management regulatory regime applicable to the jurisdiction. There are many areas in which all harvested fibre is processed first through a sawmill. In these situations, all logs are processed as saw logs, with sawn wood recovered from material with a top diameter as small as 7 – 9 cm (3 – 4"), assuming the wood is sound and other major defects are absent.

The relatively limited capacity of the sawmills operating in Labrador combined with the nature of the technology used and the historic presence in the market of a buyer for large volumes of pulp logs creates a different set of circumstances. In this situation, conventional practice has defined logs with a top diameter of perhaps 20 cm or larger as the key parameter in determining which fibre is considered saw log material. We estimate this parameter results in saw mill fibre often comprising as little as 40- 45% of the total fibre available for harvest,(and perhaps a somewhat lower percentage of the logs produced) .

A further complication on this issue in Labrador is that the advanced age of the timber results in a relatively high occurrence of rot in harvested logs. This increases the uncertainty in estimating saw log percentages in timber available for harvest.

Therefore, for the purpose of developing the financial model for the proposed venture, we have estimated, (based on the manufacturing technology recommended in the "Conceptual Manufacturing Plan" presented earlier in this Chapter), that 50% of the logs harvested will be suitable for processing through the sawmill. We recognise that more precise estimates will need to be developed as input to the detailed business plan an investor / proponent will require for implementation of this conceptual plan.

Pulp logs harvested in Labrador have typically been sold to pulp and paper mills on the Island. However, at the time of writing of this report, that market remains uncertain with the Abitibi Consolidated mill in Stephenville having been closed and operations at the Abitibi mill in Grand Falls having been curtailed.

If Island pulp markets continue to be significantly reduced, an alternative use for the logs could be to increase the amount of energy produced and sold to CFB Goose Bay. By including pulp logs with other residues, energy capacity could be increased to 1,150 HP, which the base would likely consume during only 5 or 6 months of the year.

This situation suggests that inclusion of all the pulp logs in the energy supply would create excess energy capacity. The only other potentially viable alternative would be to convert the logs to wood pellets, which may potentially create sufficient volumes for sale into export markets.

A further option may be to not operate the manufacturing operation during winter months when there is a shortage of electrical supply and little market demand for wood products. However, this approach would create a number of other challenges with regard to the viability of the facility and we have not investigated this option in detail.

Environmental Impacts & Considerations

There are a number of particular environmental impact issues which have been taken into account in development of the conceptual plan for the manufacturing operation. These include:

- Disposal of sawdust, bark, and all other residues in landfill is not considered acceptable, and indeed contravenes legislative and regulatory requirements. Therefore, the plan has been developed on the basis that all residues must be converted to some productive use;
- All manufacturing and operational areas will use proper dust extraction systems, eliminating any potential dust release into the air;
- Plant design will not include any drains to ensure that all in-process water and oils are contained within the building should a spill occur;
- Storage of residue (bark, chips, etc.) will be confined to areas specifically designed for this purpose to avoid any undesirable water runoff or uncontrolled spread of material; and,
- Noise will be managed to be within acceptable limits for an industrial park area.

INTERDEPENDENCIES & RELATED ISSUES

The geographic situation within which this proposed complex will be situated creates a number of circumstances which are not normally encountered in developing wood products manufacturing facilities. These circumstances create interdependencies between and among various elements of the proposed complex and its external environment which must be understood and which require careful attention. These include:

- Logs harvested will include both saw logs and pulp logs. We estimate that for every saw log harvested there will be a pulp log to be handled. Therefore, the conceptual plan must incorporate use of the pulp logs as well as the saw logs. This may include producing chips or even burning them to produce energy even at a loss.

- The processing of saw logs will generate lower grade products that may be difficult to sell at a profit. The plan must include processes to convert these items into desirable value added products that increase value added and reduce disposal issues.

- Residual products such as bark, sawdust, chips and planer shavings will be generated. It is important to convert them into useable products, even if at a loss, rather than disposing of them in landfill and incurring associated costs and environmental impacts.

- The proportions of each product and by-product can be estimated. The production and consumption of each must be kept in balance by a proper process design and available markets. Stockpiling of some products may be possible for short periods of time, but such material will become unusable before long. Therefore, operating balances must be maintained to ensure that 'stockpiling' of any product or material never exceeds manageable limits.

- The conceptual plan recognises that some products will be profitable while others will represent net costs. Therefore, it will be important to measure financial performance for the total complex to confirm feasibility, rather than measure profitability at the individual product level.

- A significant imbalance in the fibre and product flows within the complex, regardless of source, will be a serious detriment to the viability of the business. Therefore, the total complex must be managed as a complete, integrated operation with appropriate tools, information systems and performance indicators to ensure that necessary operating balances are maintained.

- A significant unknown is the ratio of pulp wood volume to saw log volume. Forest inventory data does not capture this data. Based on the technology incorporated into the proposed manufacturing concept, we believe the assumption of 50% saw log material / 50% pulp log material is reasonable. However, additional analysis and research on the available wood supply should be undertaken to validate this assumption during business planning for the venture.

- A small volume test was conducted to assess the occurrence of spiral grain in wood from District 19. The information gathered in that study has been used as the basis for all production and yield estimates incorporated into this plan. The very limited size of the log sample creates the possibility the test may not accurately reflect the wood size and quality that will be available to the proposed complex. Additional analysis and research on the wood supply should be undertaken to develop more definitive data on spiral grain occurrence throughout FMD 19, as well as perhaps through FMD's 20 and 21.

- The conceptual facility design incorporates recognition of the need for future flexibility to adapt to changing markets and product needs to a much greater degree than is common in most installations in operation today.

4. PROPOSED MARKETS

PROPOSED MARKETS – RATIONALE

Through the research that was conducted of local and northern national markets, it has become evident that the various products produced at the saw mill will be able to serve multiple markets. The construction grade lumber which will be produced in the mill will undergo additional manufacturing to produce higher value products such as wall panels, floor joists, roof joists and various sized beams.

As noted in the manufacturing plan, approximately 2 million fbm of sawn lumber produced by the sawmill will be surplus to the needs of the housing component manufacturing functions and will be available for sale in the local market.

The markets which are proposed to be served by the value added manufactured and composite products along with the construction grade lumber include the local market in Labrador (which includes the Straits area, Happy Valley Goose Bay Region, Labrador City Region and the coastal communities in Labrador) and the northern national market, specifically Nunavut and Northwest Territories.

Local Market in Labrador

At the time of writing this report, operating sawmills in Districts 19, 20 & 21 are located the Happy Valley – Goose Bay and Northwest River areas in Central Labrador, and in Cartwright, Charlottetown and Port Hope Simpson on the Southern Labrador Coast. A few other small mills may also operate intermittently in one or two other coastal communities.

Most of the mills are relatively small, portable band saw mills, producing a few thousand fbm annually. However, there are two somewhat larger mills operating with head rigs and circular saws located in Port Hope Simpson. In aggregate, these mills currently produce approximately 2 million fbm of green lumber which is used by local residents for renovations projects, fencing and sheds. One of the mills is able to produce graded construction lumber, but most of the output from these mills is sold without a grade stamp.

There is insufficient power availability in the area to support construction of a kiln.

Currently, almost all construction grade lumber available in Labrador is imported from elsewhere, mostly Québec, and sold through local hardware companies. The local retail price of this product reflects transportation costs which increase the effective price in the local market by approximately $125.00 - $150.00 / M fbm.

The proposed manufacturing operation will be able to supply the local market with as much as 2 million fbm of construction grade lumber annually. This volume can effectively offset supplies currently being imported and likely result in somewhat lower pricing of graded lumber in the local market.

Through interviews with stakeholders and local hardware store owners[2], we determined that the local market has a 'normal' requirement for approximately 3 million fbm annually. When housing construction activity accelerates as a result of housing demand resulting from a major industrial or mining project, for example, lumber requirements can escalate to as much as 8 million fbm per year.

National Northern Market, Nunavut & Northwest Territories

Nunavut is experiencing a housing crisis[3]. In September, 2004, more than 3,000 Public Housing units were needed in Nunavut to reduce overcrowding and enable Territory resident to enjoy housing space and standards similar to the rest of Canada. Another 1,000 units require renovation and an additional 2,700 Public Housing Units will be required to address growth in communities over the next 10 years[4].

This housing shortage has occurred for a number of reasons. First, the growing birth rate among Aboriginal Communities in Canada is also paralleled in Nunavut. Housing currently available is not suitable for the size of families that are living in Nunavut.

"Over 99% of public housing residents in Nunavut are Inuit and, with the shortage of housing such as it is, the only choice for many Nunavummiut is to add their names to the lengthy public housing waiting lists. For many people, this means years of waiting while multiple families live together and sleep in shifts within homes that average less than 1000 square feet."[5] (Readers are referred to the Appendices in which the "Ten Year Inuit Housing Action Plan is presented.)

"With about 15 people living in a three-bedroom house, three generations in one house, it's got to be really stressful for families to be living in such close quarters."[6]

Second, the climate of Nunavut and its geographic location have made it difficult to put in place a land transportation structure which allows for accessibility to the many sparsely populated communities within the territory. The high cost of labour and the transportation cost of bringing materials to the sites to build homes in Nunavut have prevented active local

[2] Interview with Mr. Lloyd White of Mother Wood
[3] "Nunavut Grapples with Housing Crunch", CBC.ca North, May 31, 2004
[4] "$2B Demanded from Feds for Nunavut Housing", CBC News, September 30, 2004
[5] Nunavut Ten year Inuit Housing Action Plan Executive summary
[6] Quote from Kowesa Etitiq, Nunavut Tunngavik's Political Adviser, to CBC News, September 30, 2004

development which is required to encourage private investment; therefore, all new housing developments in Nunavut is dependent on public sector support.

This is reinforced through correspondence received from Mr. Bill Gofton of the Nunavut Housing Corporation who indicated that "there is no private market so to speak with maybe the exception of Iqualuit where a three bedroom, 1,200 square foot modest home sells for $300,000."[7] (See also Appendices for a copy of this correspondence.)

To address some of these concerns, the Nunavut Housing Corporation is implementing a new program to encourage residents to build their own homes. The Corporation will provide the design and materials to the families, (up to ten for the pilot year), for a three bedroom or four bedroom single-level home. The family will be responsible to engage a contractor to build the home for them. The program is a grant program aimed at families who have an income to own a home which does not exceed a household income of $125,000. It is anticipated that program's recipients will be selected to be able to make the 2006 shipping season.[8]

The proximity of Labrador to Nunavut, offers potentially lower shipping costs, (during the shipping season), for building and construction materials than the Territory currently experiences.[9]

The proposed manufacturing complex will produce products that can be sold as home kits to this market. Use of materials manufactured in Labrador and relative proximity to northern markets should enable the proposed venture to address the territory's financial concerns through reduced product costs and transportation costs.

As well, additional focused research on building design and structures with the Nunavut Housing Corporation, may enable the venture to address design needs and preferences through the production of specialty composite wood products (beams, roof trusses and floor joists). Such design changes could facilitate more open floor plans than are available with conventional housing plans, enabling rooms to be used for feasts, ceremonies, crafts and other traditional activities.

[7] Facsimile correspondence from Bill Gofton, Nunavut Housing Corporation, January 25th, 2006
[8] "Nunavut to provide 'material assistance' to home hopefuls", CBC.ca North, November 25,2005
[9] Nunavut Eastern Arctic Shipping – www.neas.ca

SITUATIONAL ANALYSES

Each market which is proposed brings with it a series of attributes specific to the targeted consumers in each market. A situational analysis for each of the proposed markets follows, evaluating the strengths, weaknesses, opportunities and threats which exist in each proposed market for the products being produced by the manufacturing operation.

PRODUCT: CONSTRUCTION GRADE LUMBER

Market: ***Local Labrador Market – Wholesaling to local hardware stores for the renovations market.***

Strengths in the marketplace:

1. The low cost of transporting the products from the sawmill to the hardware store enable the product lines to be profitable within the local marketplace.

2. Selling wholesale to the hardware stores develops community support for the sawmill as it enables retailers to make a higher percentage of profit per unit.

3. The availability of the product locally at retail stores enables the consumer to purchase the construction grade lumber at a lower per unit price than imported products

4. The wholesale sales transaction between the hardware stores and the sawmill allows the sawmill to move inventory quickly, creating cash flow for the purchase of additional saw logs for the mill or operating expenses.

Weaknesses in the marketplace:

1. Construction grade lumber sold as units of 2″x 2″, 2″ x 3″, 2″ x 4″ and 2″ x 6″ will yield the lowest profitability of all products being produced. Although cash flow is created through the movement of inventory through the local hardware stores, reduced profitability occurs because of the transaction. In other words, keeping the units in inventory (depending on the cost of carrying inventory) may provide the sawmill with the product inventory required to make composite or value added products that have higher profitability built into the wholesale cost.

2. The nature of the sawmilling process precludes predetermination of the volume of each type of construction grade lumber units that will be produced. Fluctuation in production grade output may leave the sawmill with an excess of

inventory in some unit sizes. Depending on the local market requirement, some of these units may not be required and may not have any market value to the local hardware store.

Opportunities in the marketplace:

1. In Happy Valley Goose Bay there are three hardware stores to supply wholesale construction grade lumber.

2. The sawmill can also bid on tenders for CFB Goose Bay, all town councils in Labrador and the Aboriginal Band Council tenders.

Threats in the marketplace:

1. A decrease in the availability of construction grade lumber may occur as the market for housing kits and specialty products or composite products increases with marketing and sales activity.

2. The availability of the products from the sawmill may create a sense of competition within the hardware stores if there is any storefront retailing or direct selling of construction grade lumber to the general public or local construction companies.

PRODUCT: HOUSING KIT COMPONENTS

Market: ***Local Labrador Market – Wholesaling to local hardware stores for the building market.***

Strengths in the marketplace:

1. The ability of the proposed venture to supply component parts and housing kits to local governments, CFB Goose Bay and Aboriginal communities has the potential to reduce prices in the local market without reducing overall profitability because of local product availability elimination (or at least reduction) of high transportation costs associated with use of products imported from other areas.

2. The decrease in overall building costs to the contractor should be passed along to the consumer, lowering their overall cost of building in the local area in comparison with using imported goods.

Weaknesses in the marketplace:

1. At the time of writing this report. the local housing market is relatively weak because of a declining population base. Traditionally the highest level of activity for home building has been in the Happy Valley - Goose Bay, with anywhere from 5 – 35 homes constructed annually, depending on the overall economic situation in the community during a given construction season. Housing construction activity in the Labrador City region accounts for approximately half the volume of activity in central Labrador. There is very little other construction activity occurring in other communities in the Straits area and along the coast, except during periods when significant projects are under development.

2. Although most home building activity takes place in the Happy Valley Goose Bay region, other project driven developments will occur in more northern communities and along the south coast of Labrador or in Labrador City region. To access these areas, additional transportation costs may be incurred, potentiall reducing profitability and impairing competitiveness if other suppliers are more advantageously positioned.

3. There may be substantial cost to trucking housing kit items because they are partially assembled which creates the effect of 'shipping air'. However, the inherently higher value of the assembled modules being shipped may well offset this. Research into the best format for shipping (assembled, disassembled, partially assembled) will need to be further researched to ensure the products are being transported as efficiently as possible to the marketplace.

Opportunities in the marketplace:

1. The conceptual model could allow for pre-ordered components from contractors on an as required basis with a turn around time for delivery dependant on the size and type of order.

2. The model could also enable management to bid on national tenders for any of the items that the complex is producing from composite wood products or value added manufactured wood products.

3. Once the Trans Labrador Highway from Happy Valley - Goose Bay to Paradise River / Cartwright is opened, the accessibility of northern Island markets in Newfoundland becomes greater. Management of the complex can assess these market opportunities to identify opportunities to supply the Northern Peninsula markets.

4. It may be possible to establish cooperative relationships with other producers of mouldings, flooring, and cabinets to incorporate their products into the housing components being produced by the proposed operation.

Threats in the marketplace:

1. As pre-orders from northern national markets grow, product volumes available for the local Labrador market may be constrained.

PRODUCT: HOUSING KIT COMPONENTS

Market: Northern National Market – Nunavut

Strengths in the marketplace:

1. The cost of shipping the products from Happy Valley Goose Bay is less than the cost of shipping from any other port of call into Nunavut.

2. The proposed manufacturing concept is based on work cells which will have the flexibility to produce highly specialized products that can allow for more efficient home building in Nunavut.

3. The majority of housing in Nunavut is Public Housing and is being developed according to the Nunavut Ten Year Inuit Housing Action Plan. Developing and maintaining a close relationship with the Nunavut Housing Corporation will help establish a sales relationship for the proposed venture.

Weaknesses in the marketplace:

1. The distance between Labrador and Nunavut, without staff marketing and networking with the Government and contractors may result in longer turnaround times for sales.

2. Costs to engage contractors in Nunavut, (an anticipated function of the limited number of contractors operating there), may reduce the number of homes being built each season due to budgetary constraints in Government.

Opportunities in the marketplace:

1. Relationships between Aboriginal governments in Labrador and Nunavut can be established and developed to facilitate a business network that will generate bi-directional delivery of goods and services.

2. Relationships with construction companies in Labrador and Nunavut have already been established with Aboriginal Governments. Targeting these construction companies for sales will help establish the distribution channel for sales development between Labrador and Nunavut.

Threats in the marketplace:

1. Other contractors and business interests may have well established relationships with Nunavut government organizations. It may be necessary to establish and develop cooperative relationships with these groups.

2. Weather conditions can curtail the shipping season between Labrador and Nunavut, negatively affecting sales.

3. Various factors, (eg. fuel) can affect the cost of transportation and create negative impacts on margins for the proposed venture.

MARKET DEVELOPMENT RECOMMENDATIONS:

There are a number of ways a market can be established locally for structural lumber and housing kits. The following information outlines suggested approaches for market development which is aimed at bulk sales of goods to assist with cash flow for the operation model.

Structural Lumber – Local Market

It is recommended that development of local markets for structural lumber be pursued through establishment of wholesale relationships with local hardware store retailers in the immediate area of Happy Valley - Goose Bay. These businesses have existing relationships with contractors and other companies they supply and can serve as an effective distribution channel for the proposed venture.

Housing Kits and Component Parts – Local Market

To establish sales for the housing kit components in the local market, it is recommended that a networking relationship between local contractors be established and a pre-order system for component parts and entire kits be developed. The relationship can be a contractor pricing relationship, a wholesale relationship with a contractor acting as a distributor of products or a retail purchasing relationship.

To market the products effectively from a retail perspective will require a storefront operation to be added to the model. However, it may be more practical and profitable to organize the retailing of the component parts and housing kits through the local hardware stores through a continuation of the wholesale structural lumber relationship, allowing a pre-order system to be accessed through the hardware store so that they do not have to carry the inventory on these products (or only carry a minimal amount) due to the size and floor space that the assembled product may require.

Housing Kits – Northern Markets

In Nunavut , most housing construction is provided or supplemented by public funds. Therefore, it will be essential that the proposed venture establish a relationships with the Nunavut Government and the Territory offices of the Canada Mortgage and Housing Corporation (CMHC). This will assist in recognizing the requirements of this region from one year to the next and the manner in which each housing development is being funded.

For example, the new business must be able respond to Calls For Tenders on specific material requirements for Nunavut Housing. By developing relationships with appropriate Territorial officials, the new business can develop an understanding of local market needs, particularly as these relate to development, constraints around the shipping season and transportation requirements.

Working with contractors active in that market will also be essential to the establishment of a supplier sales relationship in this region. Working with contractors to reduce their overall costs, increase their profitability through reduced product costs and transportation costs can solidify a seasonal supply relationship with Nunavut for future years.

For example, by working with local contractors and CMHC the new venture can become a recognised supplier to the grant program where CMHC provides design and material assistance to individuals becoming new homeowners. Establishment of a relationship of this nature may also create opportunities for other value added product manufacturers in the Province to access this market.

It is important to realize that access to a market will only occur once the establishment of a network base is completed. Therefore it is recommended that management of the proposed

venture recognize the importance of network relationships to market development success and focus on this approach as a key element of the overall strategic marketing plan for the business.

5. WOOD SUPPLY & RELATED ISSUES

LABRADOR FIBRE RESOURCE - OVERVIEW

As background to this study, it is noted that a forestry agreement was reached between the Province of Newfoundland and Labrador and the Labrador Métis Nation. One of the deliverables negotiated within that agreement was for a feasibility study "into the value-added and secondary forest products in Labrador in conjunction with local stakeholders".[10]

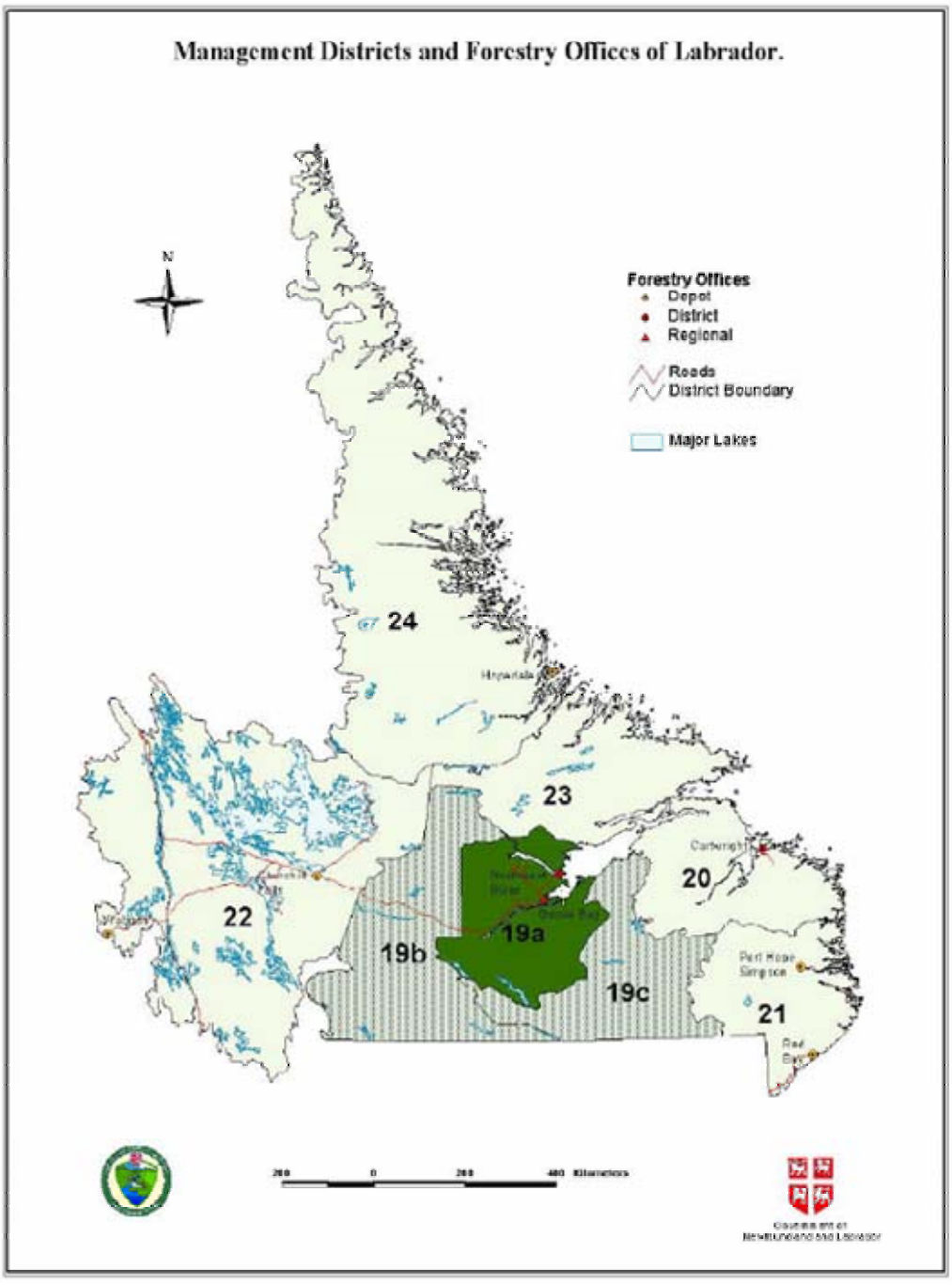
The resource base considered in this agreement includes the management areas both north and south of the Churchill River known as FMD 19. The annual allowable cut has been determined net of set-asides (after adjustments for non-timber management issues and domestic harvest allocations).

In addition, the scope of this study was extended to include FMD 20 and FMD 21, respectively the Cartwright and Port Hope Simpson areas of the Southern Labrador Coast.

The first resource management plan currently in use in FMD 19 was developed jointly by the Innu Nation Environment Office and the Newfoundland and Labrador Department of Forest Resources and Agrifoods.

Data included in the recent "Five year Operating Plan for Forest Management District 19A (Goose Bay) serves as the basis for the study undertaken. The map below identifies the subject area.

[10] 2004-2005 Annual Report – NL Department of Natural Resources, page 5


Management Districts and Forestry Offices of Labrador.
N
Forestry Offices
Depot
District
Regional
Roads
District Boundary
Major Lakes
24
23
22
20
19a
19b
19c
21
Hopedale
Port Hope Simpson
Red Bay

ANNUAL ALLOWABLE CUT

The total Annual Allowable Cut in the three Forest Management Districts which comprise the study area is summarised in the following table;

Forest Management District	AAC (m^3)
District 19 – North of Churchill River	*56,700*
District 19 – South of Churchill River	*141,900*
Total District 19	198,600
District 20	30,000
District 21	49,000
Totals	277,600

Source: Newfoundland & Labrador Department of Natural Resources

Under the current Operating Plan, the District 19 AAC is divided into distinct management areas: North and South of Churchill River or as they are known by the residents Northside and Southside. The plan proposed that most of the management activities and commercial harvesting allocations take place on the Northside.

In the absence of a bridge crossing over the Churchill River, timber located south of the river has been inaccessible. However, a bridge is being built across the Churchill River and is expected to be completed during the 2006 construction season. The bridge will form a key component of the Goose Bay Cartwright Junction portion of the Trans-Labrador Highway which is scheduled for completion in 2009.

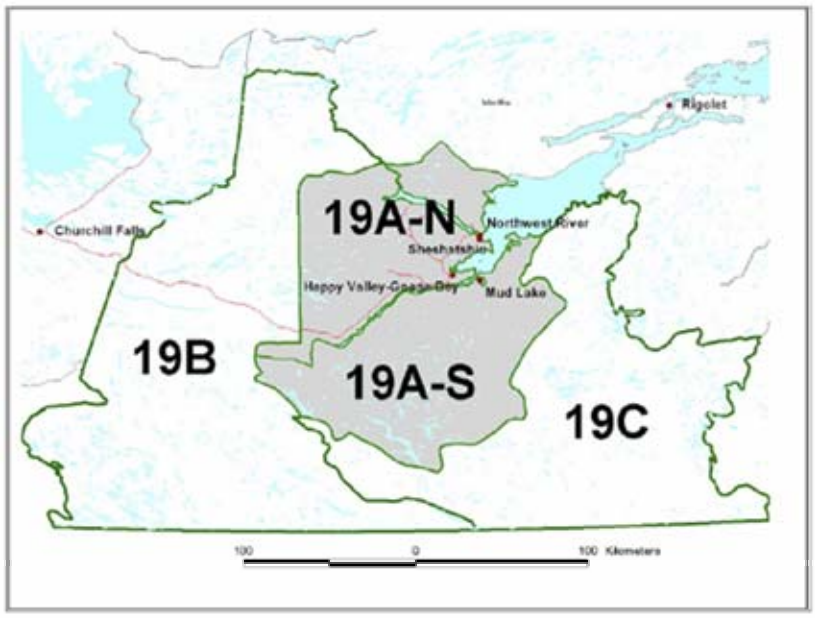
The opening up of access to Southside allocations will require an amendment to the Operating Plan for District 19.

According to the plan the total AAC for District 19A is 198,600 m^3.

In previous plans, AAC was calculated as 400,000 m^3.

"The primary reason for this reduction in the AAC was due to the major shift in planning emphasis under the Forest Process Agreement and through the incorporation of public values and concerns (both aboriginal and non-aboriginal) which were raised during the consultation process."

The map below shows the area in more detail.



Annual Allowable Cut – FMD 19

Management Class	AAC Contribution (m^3/year)	% of AAC
Commercial Areas	53,700	27 %
Domestic Reserves	3,000	2 %
Northside Total	**56,700**	**29 %**
Commercial Areas	127,400	64 %
Domestic Reserves	10,500	5 %
Selective Reserves	4,000	2 %
Southside Total	141,900	71 %
District 19A Total	**198,600**	**100 %**

Source: Newfoundland & Labrador Department of Natural Resources

The AAC table above summarises the harvest allocations for FMD 19 by permit type and management area over the five-year operating period. As the table below shows, through the five-year period 2004 – 2009, 299,500 m^3 has been allocated for total Commercial operations in the District. Of that total, it is anticipated that only 16,000 m^3 will be available from Southside areas, with no supply available for commercial use.

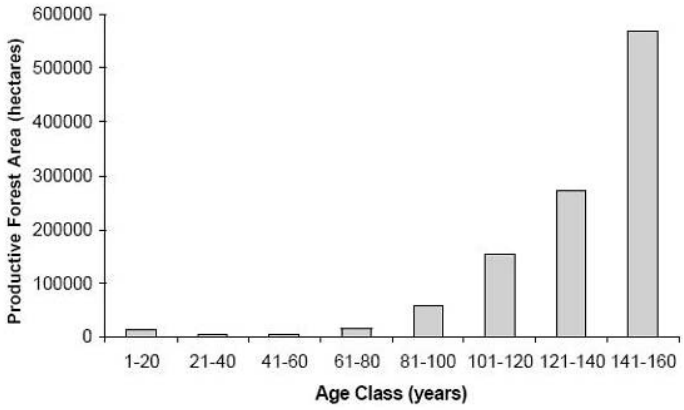
Year	Commercial (m^3)		Selective* (m^3)		Domestic (m^3)		Total (m^3)	
	Northside	Southside	Northside	Southside	Northside	Southside	Northside	Southside
2003-04	50,700		1,000		5,000	2,000	56,700	2,000
2004-05	50,700		1,000		5,000	2,000	56,700	2,000
2005-06	50,700		1,000	2,000	5,000	2,000	56,700	4,000
2006-07	50,700		1,000	2,000	5,000	2,000	56,700	4,000
2007-08	50,700		1,000	2,000	5,000	2,000	56,700	4,000
Total	253,500		5,000	6,000	25,000	10,000	283,500	16,000

Source: Newfoundland & Labrador Department of Natural Resources

AGE CLASS STRUCTURE

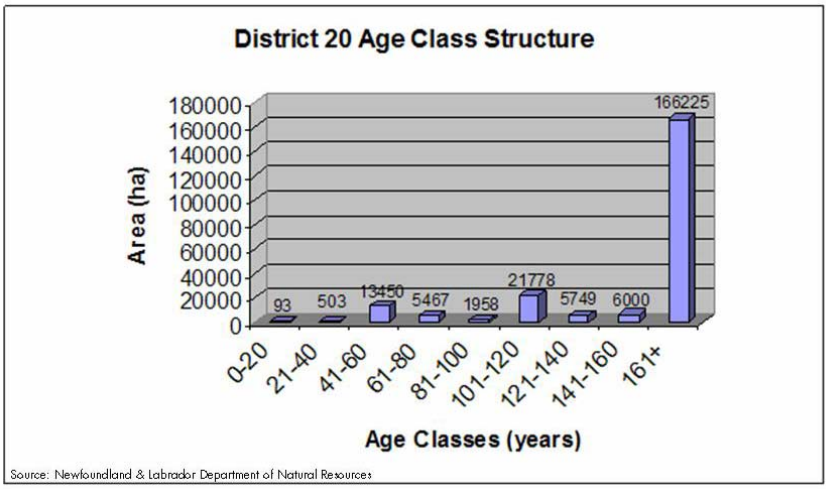
Generally, timber in Labrador can be classed as mature or over mature. Species compositions are mainly black spruce and balsam fir . However, as the following graphs from the Forest Management Plans for each District show for age class structure, the forest is very old.

Age Class Distribution – Productive Sites – District 19A

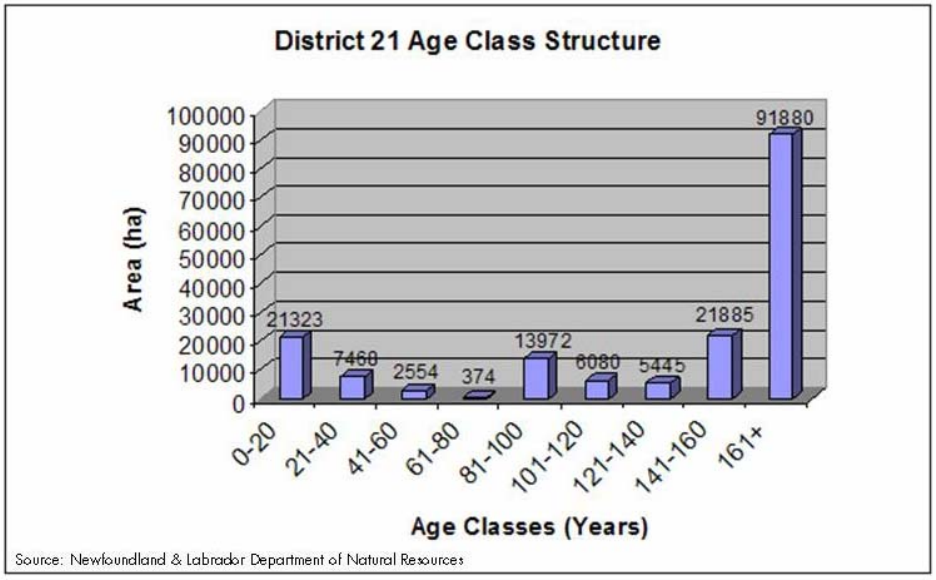


Source: Newfoundland & Labrador Department of Natural Resources

Age Class Distribution – Productive Sites – District 20

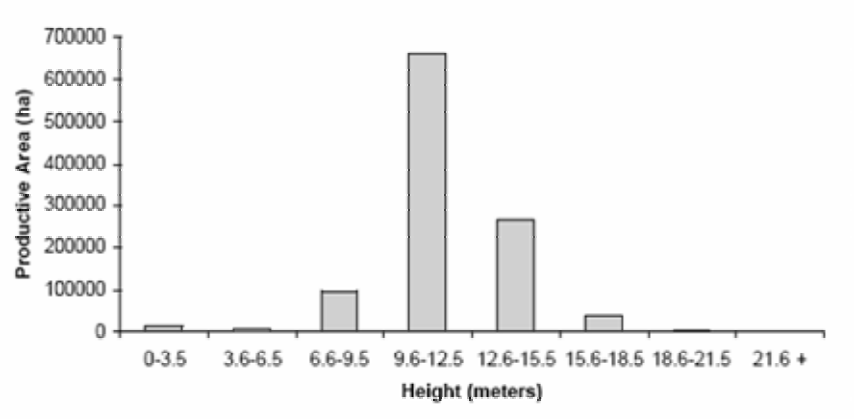


Age Class Distribution – Productive Sites – District 21



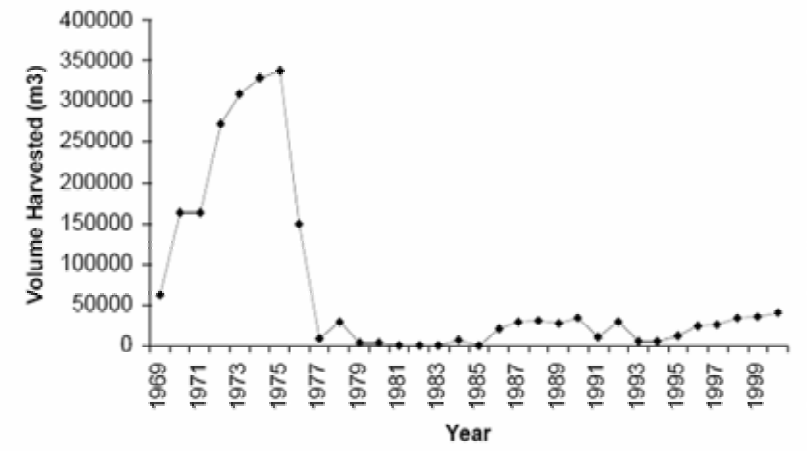
Tree height is reasonable, varying between 6.6 metres and 15.5 metres in height, as shown in the graph below.

Height Class Distribution On Productive Sites In District 19A



Harvesting activities south of the Churchill River, as shown below, have been limited for the last 20 years. This fact leads us to assume that most of the forest in that area will have very similar age structure to the forest in the productive areas north of the river, (which are portrayed above).

Annual Harvest Volumes, 1969 - 1999



Source: Newfoundland & Labrador Department of Natural Resources

TIMBER ALLOCATIONS & RELATED ISSUES

Current annual harvest allocations in District 19 total approximately 54,000 m^3, essentially the full volume of accessible AAC. In District 20 annual harvest allocations total approximately 5,000 m^3, while in District 21 virtually the entire AAC of 49,000 m^3 is allocated.

Timber volumes allocated to two license holders, totalling 33,000 m^3, are intended to support sawmill operations. Indeed these timber allocations are based on 'commercial mill licenses' that have been issued to these businesses under the Forestry Act. However, neither of these businesses is currently operating a sawmill.

One these licensees owns an older mill which has been mothballed for at least 8 – 10 years, while the other licensee has experienced chronic financial challenges and has not operated its mill more than sporadically for 2 – 3 years. The sporadically operated mill is also very old technology and, when operating, would be unlikely to achieve recovery efficiencies considered normal in today's industry.

The licensee with the mothballed mill has carried on an active harvesting operation. As noted above, the company has harvested timber from its own license, as well as from other allocations. The license holders receive payment for the timber harvested from their license areas at a rate negotiated privately between the parties involved.

The challenge this situation creates for the Department of Natural Resources as well as for prospective new ventures – whether that be a relatively complex facility such as that proposed in this plan or small mobile band-saw mill – is that a situation is created in which the full AAC has been allocated, even though the mills that were intended to be supported by the allocation are no longer operating.

This places the active harvest license holders in an intermediary position between the timber owner – the Crown – and the proposed mill; and, because these intermediaries demand some payment for the timber harvested, the cost of raw material to the mill will be higher than would be the case if the new mill received a harvest allocation directly.

This type of situation can exist because there is no direct linkage in legislation or regulation between processing capacity for which mill licenses are issued and timber allocations for which harvesting licenses are issued. An existing mill license holder can as a result maintain the appearance that processing capacity equal to harvest allocations continues to exist, merely by continuing to pay the annual license fee of $100.00.

Immediate pressures on timber supply in FMD 19 will likely be alleviated within the current year with the opening of access to timber on the south side of the Churchill River. However,

the prevailing practice of matching allocated Annual Allowable Cut harvest licenses to the apparent licensed 'processing capacity' for which commercial mill licenses have been issued regardless of whether the allocated harvest amount is in fact supplying licensed processing capacity can serve as a significant constraint on the development of new forest-based businesses.

The practice also creates a situation in which the license holder is, in effect, speculating in Crown timber and could potentially threaten the viability of a manufacturing facility that could not obtain a license and was forced to purchase timber from an existing harvest license holder. In the absence of any Crown authority to direct the flow of fibre from a harvest license to a processing mill, the harvest license holder could potentially in effect hold a processing mill to ransom and demand a premium price for Crown timber.

This approach to licensing harvest volumes and processing capacity could also create a significant risk to continued success of viable processing operations. Mills that are profitable and successful typically invest in process improvements which have the effect of increasing throughput capacity and mill productivity. Such investments in several successful mills could easily create a situation in which the *effective capacity* of licensed mills increases beyond the AAC available to feed the mills. The investments in the mills, and the related employment, can thus be at risk.

We are not aware of such practices and circumstances existing anywhere else in Canada; and, we suggest this approach to timber allocation is a potential constraint on development of the forest products industries in Newfoundland and Labrador. A more direct, transparent and clearly articulated linkage between licensing of processing mills, (including the timber consumption requirements inherent in those mills), and licensing of the timber harvesting needed to support those mills would be helpful to all participants in the forest products sector.

FIBRE SUPPLY FOR MANUFACTURING FACILITY

The wood supply, which would be deemed economically viable for a manufacturing facility near Happy Valley – Goose Bay would be the District 19A AAC of 198,600m3. This assumes the road and bridge infrastructure on the Southside are in place. There is the potential for some wood from District 20 to be available.

During site visits by our team to Labrador we viewed wood quality and size of both harvested logs and standing timber. Logs prepared for shipment to an Island mill were viewed on the loading docks. As well, a visit was made to view the wood harvested for the Trans-Labrador Highway on the Southside of Churchill River and, at the same time, standing timber in near proximity to the highway corridor was also viewed.

Diameter, butt rot, spiral grain and length were observed. Lengths observed confirmed the figures shown in the Forest Ecosystem and Strategy Plan and included here in a previous figure.

A subsequent sawing test provided a diameter distribution of a representative sample of logs form District 19. A summary of the results of that test is included in the Appendices to this report.

Based on these observations, (and depending on mill processing technology and processing approach, as discussed previously), we have estimated that approximately 50% (±10%) of the available timber supply could be judged to be saw log material. This could result in approximately 100,000m^3 (±10%) of timber being available for sawmill operations.

This also assumes "short butting" at the time of harvest, which would be done to improve the log quality.

As a result of the observed length of the trees there is potential for random length type operations.

Fibre Costs For Manufacturing Facility

Historical fibre costs to Happy Valley – Goose Bay in this area appear consistent with industry standards.

The following is an estimate of costs to harvest the wood. The average haul distance is between 35 - 40 kilometres. A contractor who provided us with harvest cost estimates also provided us with estimates for access road upgrading and maintenance. However, we have not included any costs associated with resource management in our estimate of fibre costs for the proposed venture.

Large capital expenditures on roads, if required, could alter the following estimate of costs:

	Cost / m^3
Harvesting	13.00
Forwarding	7.00
Transport	9.30
Road (Maintenance & Construction)	10.50
Administration	8.16
Royalties (stumpage)	5.56
Total	53.52
Plus Profit 5%	2.68
	$56.20

(Estimated based on experience and discussions with local operators and other industry participants. It should also be noted here that no allowance has been made for deductions from royalties for road building and other factors that would typically reduce the total cost of fibre somewhat.)

Historically, most of the harvesting costs have had to be absorbed by the pulpwood component of the tree because of the sporadic nature of the market for softwood logs from Labrador.

We estimate that to produce and sell fibre a harvesting contractor would need require a minimum price of $55/m^3 delivered to mill site in Happy Valley – Goose Bay. This is the value we have used in our Operational Model. However, we recognise this cost could be higher, depending on road construction costs in Southside harvest areas.

This value is comparable to cost of pulpwood delivered by barge to Island pulp mills. Our research indicates that the cost of wood delivered by barge was approximately $70 / m^3, including roughly $20 / m^3 for barge transportation.

6. BUSINESS PLAN / OPERATIONAL MODEL

OVERVIEW

Before the proposed manufacturing plan can be made operational a number of organizational, governance and management issues will need to be addressed by the venture proponents[11]. These will include:

- Development of a relationship with a building materials supplier (or suppliers) that can supply the non-wood building products and materials – eg. plumbing and electrical supplies and fixtures, insulation, drywall, shingles, etc. -- needed to ensure the housing kits can be constructed into complete dwellings;

- Development and implementation of an approach to staging, assembly and shipping of the kits to destination markets;

- Development of relationships with contracting firms with capabilities to create appropriate foundations for the housing and to undertake final assembly of kits on site at customer locations; and,

- Development of effective working relationships with the housing authorities and similar agencies in northern territories and communities that represent potential clients for the proposed venture.

Building Materials Supply Relationship

During the course of our research we learned that a building supply dealership in Central Labrador has been, (or is in the process of being), acquired by an agency of an aboriginal community. It is our understanding that the primary rationale for the acquisition was to enable the aboriginal community to exercise more effective control over of the supply chain that supports housing construction in Labrador. We would suggest this building supply dealership could potentially be an appropriate partner for the manufacturing venture.

[11] Identification of prospective investors / proponents for the venture is beyond the scope of this assignment. However, we would suggest that several stakeholder groups, for example organizations related to First Nations communities, could well be appropriate participants, particularly given the suggested market focus for the venture.

Staging & Assembly

Our market research suggests that there will be differing requirements among northern community customers with regard to the 'degree of completion' required of the housing kits when shipped from the plant. Some discussions and documentation reviewed indicate that some purchasers will want kits shipped to a degree of completion that on site construction will be limited to erection and connection of largely complete panels – i.e. with exterior cladding, windows, wiring, insulation, and panelling installed. However, other housing program information seems to indicate that on site installation of these materials will be preferred.

For example, one program that in our view holds considerable promise as a potential market for the proposed venture is the Nunavut housing authority program to encourage individual home ownership. The program will provide families with $125,000 for design and building materials, with the family expected to contribute labour for assembly. The preliminary information available to us at time of writing this report suggests that housing kits supplied to this program would be shipped in a 'limited completion' state.

Significant variations in specifications and requirements can be anticipated across the spectrum of prospective client housing programs. Similarly, requirements for 'packaging / assembly' can be expected to vary among client communities depending at least in part on the nature of transportation used between plant and customer, and the handling infrastructure available at the customer community. In some instances, full containerisation will be appropriate, while in others stacking the kit and related materials on the floor plate and 'shrink wrapping' the entire package will be effective.

The assembly and staging functions will therefore need to incorporate sufficient flexibility to meet these different customer requirements.

For the purposes of this plan, we have viewed the assembly / staging function as separate from the wood products manufacturing business. Its operations have therefore not been included in the financial model for the wood products business. However, depending on how ownership of the wood products manufacturing business evolves, both operations could well be linked. Having both businesses located adjacent to each other would also enhance the efficiency of both.

Construction & Final Assembly Contracting

During our research we identified several contracting firms that specialise in residential construction in northern communities. We did not make contact with these firms regarding the potential for a relationship with the proposed wood products venture; though we did interview a senior executive with one firm about general aspects of the residential construction market in the far north.

It will be essential to the success of the proposed wood products venture that any contractor(s) with which a relationship is established be acceptable to and able to meet any professional and technical qualifications requirements established by prospective housing authority customers.

We would suggest therefore an objective to be achieved during development of relationships with these prospective customer organizations should be identification of one or more contractors that are known to be acceptable to the prospective customers and with which effective working relationships / alliances can be established.

Developing Relationships With Prospective Client Organizations

As discussed within the context of the *People Sphere* requirements, significant effort will need to be devoted to establishing, developing and nurturing multiple relationships with individuals involved in the prospective customer organizations in many different roles. This is a process that can be expected to take some time, evolving over several months before sales can be achieved.

START-UP / IMPLEMENTATION ISSUES

At several points in this plan we have identified issues that will need to be resolved / addressed before operations can begin successfully. These include:

- Identification of investor proponents, either from within Labrador or from elsewhere who can be attracted to the opportunity in Labrador, who can lead the initial stages of formation and development of the proposed venture;

- Recruitment of a senior management team – initially, at a minimum, consisting of a Chief Executive Officer, a senior marketing and sales professional, a senior engineering / manufacturing manager, and an experienced forestry operations and raw material procurement manager – which will be given the mandate bring the business into operation;

- Identification, selection and securing of an appropriate site and building for the venture;

- Determination of energy supply arrangements and related selection and implementation of the appropriate mix of operating activities to be included in the venture, (from energy options presented in the manufacturing plan);

- Securing appropriate timber harvest licensing arrangements and contracting / employment of adequate harvesting capacity;

- Identification of and development of relationships with organizations with expertise in the building materials supply chain and in staging and assembly functions that can become effective 'partners' for the venture in these operational areas; and,

- Establishment and development of sales-focused relationships with Labrador and northern territory housing organizations that are prospective clients of the venture.

We have assumed the senior management team, once recruited and in place, will need approximately six months to address and resolve these issues effectively and to develop a detailed business / implementation plan for the venture. A further six month operational start-up period will also be needed.

These requirements have been incorporated into the financial model for the venture.

CAPITALIZATION SUMMARY

As shown in an earlier chapter, the capital investment required for the venture is approximately $8.5 – $9.5 million, depending on options chosen for waste treatment and energy production.

In addition, total capital investment will be required to increase by another $4.55 million if buildings need to be constructed for the venture.

Total capitalization will also have to provide for approximately $2.0 million in losses that are likely to be incurred during the start-up period.

Thus, total capitalization of the venture will be approximately $11.5 million exclusive of buildings, and approximately $16.0 million if construction of buildings is required.

For the purposes of developing a financial model of the venture, we have assumed that 50% of total capitalization will be in the form of equity and 50% in debt carrying an average annual interest rate of 7.5%.

If building construction is required, we assumed for purposes of the financial model that 75% of that capital cost would be financed through longer term debt, also at an annual interest rate of 7.5%

FINANCIAL MODEL

FINANCIAL MODEL

	Start-Up Year					Full Operating Year - One Shift - Mill Waste To Internal Energy - Pulp Fibre to Pellets / Energy to Recover Cost					Full Operating Year - Two Shifts - Mill Waste To Internal Energy - Pulp Fibre to Pellets / Energy to Recover Cost				
	Q-1	Q-2	Q-3	Q-4	Total	Q-1	Q-2	Q-3	Q-4	Total	Q-1	Q-2	Q-3	Q-4	Total
Revenues –															
Lumber Sales - Local Market			275,000	275,000	**$ 550,000**	137,500	137,500	137,500	137,500	**$ 550,000**	275,000	275,000	275,000	275,000	**$ 1,100,000**
House Kit Sales				687,500	**$ 687,500**	1,718,750	1,718,750	1,718,750	1,718,750	**$ 6,875,000**	3,437,500	3,437,500	3,437,500	3,437,500	**$ 13,750,000**
Energy / Pellet Sales at Pulpwood Cost			137,500	275,000	**$ 412,500**	412,500	412,500	412,500	412,500	**$ 1,650,000**	825,000	825,000	825,000	825,000	**$ 3,300,000**
Total Revenues	**$ 0**	**$ 0**	**$ 412,500**	**$ 1,237,500**	**$ 1,650,000**	**$ 2,268,750**	**$ 2,268,750**	**$ 2,268,750**	**$ 2,268,750**	**$ 9,075,000**	**$ 4,537,500**	**$ 4,537,500**	**$ 4,537,500**	**$ 4,537,500**	**$ 18,150,000**
Direct Operating Expenses –															
Sawmill -															
Roundwood			275,000	550,000	**$ 825,000**	825,000	825,000	825,000	825,000	**$ 3,300,000**	1,650,000	1,650,000	1,650,000	1,650,000	**$ 6,600,000**
Wages & Benefits			166,400	166,400	**$ 332,800**	166,400	166,400	166,400	166,400	**$ 665,600**	332,800	332,800	332,800	332,800	**$ 1,331,200**
Maintenance, Energy & Other			14,375	28,750	**$ 43,125**	57,500	57,500	57,500	57,500	**$ 230,000**	72,500	72,500	72,500	72,500	**$ 290,000**
Value Added Operations -															
Wages & Benefits			210,600	210,600	**$ 421,200**	210,600	210,600	210,600	210,600	**$ 842,400**	421,200	421,200	421,200	421,200	**$ 1,684,800**
Non-Wood Materials			72,232	145,996	**$ 218,228**	109,443	109,443	109,443	109,443	**$ 437,770**	218,885	218,885	218,885	218,885	**$ 875,540**
Maintenance. Energy & Other			6,875	13,750	**$ 20,625**	27500	27500	27500	27500	**$ 110,000**	37500	37500	37500	37500	**$ 150,000**
Total Direct Operating Expenses	**$ 0**	**$ 0**	**$ 745,482**	**$ 1,115,496**	**$ 1,860,978**	**$ 1,396,443**	**$ 1,396,443**	**$ 1,396,443**	**$ 1,396,443**	**$ 5,585,770**	**$ 2,732,885**	**$ 2,732,885**	**$ 2,732,885**	**$ 2,732,885**	**$ 10,931,540**
Sales, General & Administration Expenses															
Management Salaries & Benefits	80,000	80,000	80,000	80,000	**$ 320,000**	80,000	80,000	80,000	80,000	**$ 320,000**	80,000	80,000	80,000	80,000	**$ 320,000**
Marketing & Sales	20,000	20,000	15,000	15,000	**$ 70,000**	10,000	10,000	10,000	10,000	**$ 40,000**	10,000	10,000	10,000	10,000	**$ 40,000**
Administration	5,000	5,000	5,000	5,000	**$ 20,000**	5,000	5,000	5,000	5,000	**$ 20,000**	7,500	7,500	7,500	7,500	**$ 30,000**
Interest Expense (Excl. Buildings)			107,813	107,813	**$ 215,625**	107,813	107,813	107,813	107,813	**$ 431,250**	107,813	107,813	107,813	107,813	**$ 431,250**
Depreciation (Manufacturing Equipment)			245,179	245,179	**$ 490,357**	245,179	245,179	245,179	245,179	**$ 980,714**	245,179	245,179	245,179	245,179	**$ 980,714**
Depreciation & Energy (Pellet Plant)			100,893	107,143	**$ 208,036**	119,643	119,643	119,643	119,643	**$ 478,571**	119,643	119,643	119,643	119,643	**$ 478,571**
Total Other Expenses	**$ 105,000**	**$ 105,000**	**$ 553,884**	**$ 560,134**	**$ 1,324,018**	**$ 567,634**	**$ 567,634**	**$ 567,634**	**$ 567,634**	**$ 2,270,536**	**$ 570,134**	**$ 570,134**	**$ 570,134**	**$ 570,134**	**$ 2,280,536**
Net Operating Income / -Deficit	**$ -105,000**	**$ -105,000**	**$ -886,866**	**$ -438,130**	**$ -1,534,996**	**$ 304,674**	**$ 304,674**	**$ 304,674**	**$ 304,674**	**$ 1,218,694**	**$ 1,234,481**	**$ 1,234,481**	**$ 1,234,481**	**$ 1,234,481**	**$ 4,937,924**
If Buildings Required --															
Depreciation - (Buildings)	70,000	70,000	70,000	70,000	**$ 280,000**	70,000	70,000	70,000	70,000	**$ 280,000**	70,000	70,000	70,000	70,000	**$ 280,000**
Interest Expense - (Buildings)	63,750	63,750	63,750	63,750	**$ 255,000**	63,750	63,750	63,750	63,750	**$ 255,000**	63,750	63,750	63,750	63,750	**$ 255,000**
Revised Net Income / -Deficit	**-238,750**	**-238,750**	-1,020,616	**-571,880**	**$ -2,069,996**	**170,924**	**170,924**	**170,924**	**170,924**	**$ 683,694**	1,100,731	1,100,731	1,100,731	1,100,731	**$ 4,402,924**

KEY OPERATIONAL / FINANCIAL ASSUMPTIONS

The assumptions on which the financial model has been developed are as follows:

1. There is no market for pulp fibre in any form, and therefore pulp logs and residual fibre generated by the sawmill are assumed to be converted into energy or pellets and sold on a cost recovery basis.

2. The selling price for lumber sold into the local market is assumed to be $550 / M fbm, which represents a premium of $100 over the Random Lengths January 2006 quoted Toronto market price for kiln dried Eastern SPF, #2 & Btr.

3. The unit price for the housing kits produced has been assumed to be $13,750, fob mill. This we believe to be a cautious and conservative assumption, however, in the absence of reliable price data, we believe this approach to be appropriate. This price also represents an increase in value of 250% over the price level assumed for the lumber sold into the local market.

4. While the operation will generate most of its energy requirements, purchase of some energy (1 – 3 MW estimated) is anticipated. It may be possible for the plant to achieve self-sufficiency through use of wind turbines or installation of diesel generators, however, we have not developed these options in detail and hence no operating costs and depreciation expense for energy related equipment is included.

5. Hourly wages for the sawmill workforce is assumed to be $20.00, inclusive of benefits. The hourly wage for workers in the value added functions is assumed to be $22.50 inclusive of benefits.

6. Round wood cost is assumed to be $55 / m^3, delivered to the mill.

7. Manufacturing equipment is assumed to be depreciated over a 7 year period, on a straight line basis.

8. If construction of buildings is required, these are assumed to be depreciated over a 15 year period, on a straight line basis.

9. Costs for site preparation and services have not been included in the model. If the operation were to be located elsewhere but CFB Goose Bay, this expense could be significant.

10. The annual interest rate for all debt associated with the venture has been assumed to be 7.5%.

11. The equity portion of the assumed total business capitalization value of $11.5 million is assumed to be 50%.

12. If construction of buildings is required, the equity portion of the estimated cost of the manufacturing buildings and pellet plant, ($4.55 million), is assumed to be 25%.

APPENDICES

A. LOG QUALITY TEST REPORT

B. NUNAVUT HOUSING STRATEGY – EXECUTIVE SUMMARY

C. SITE LAYOUT FOR MANUFACTURING PLAN

D. REFERENCES & BIBLIOGRAPHY

A. LOG QUALITY TEST REPORT

Objective

The logs from Labrador are known for their high amount of spiral grain. The objective of the sawing trial is to obtain some indication of the issues resulting from spiral grain.

1. Determine the quality of lumber generated from logs originating from Labrador

2. Identify potential problems in processing logs with considerable spiral grain.

Methodology

The saw logs for the trial were provided and scaled by NFLD Forest service. The total volume of wood according to the NFLD log scale was 1216 fbm from the South side of the Churchill River and 2800 fbm from the North side.

The logs were processed at Milton Hardwoods in Clarenville, Newfoundland on a small circular saw Forano carriage (3 sided) and then re-sawn on a Baker band mill. The logs were sawn from November 21 to 23.

The scaling data showed an average top diameter of 5.1 inches for the logs from the South side and 6.4 inches for the North side. This numbers are not representative since the logs selected from the North side were partly selected based on their ease of access and to provide a sample of wider boards. The South side sample is probably more realistic representation of the wood available. The diameter distribution for the samples is shown below.

Figure 1: Top diameter distribution for the North and South sides separately

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Figure 2: Top diameter distribution for the all the logs

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There was also another Labrador log sample trial in progress at the same time and information on the angle of the spiral grain relative to the center of the log was obtained. The results are shown in the figure below.

Figure 3: Spiral grain angle as measured on the second log sample

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Figure 3: Physical properties of second log sample

Average top diameter	5.6 inches
Average taper	0.23 inches per foot
Average spiral grain angle	6.1 degrees

The logs processed on the headrig were sawn on three sides to obtain the proper board width. The logs from the South side were identified and kept separate during the trial.

Sideboards were obtained on the larger diameter logs but were not edged in order to observe the effect of spiral grain on wider pieces. The sideboards were typically 8 to 12 inches wide, whereas edging them would have resulted in 6 inch wide boards. The bigger flitches were retained to be later resawn.

At the resaw the cants were sawn into 2” nominal boards (actual thickness was 1 7/8 inches). Ten cants were sawn into 1” nominal boards (1 1/16” actual). The flitches and sideboards were all processed to a 1” nominal thickness.

The products were recorded per package as listed in Figure 4. The volumes are estimated based on nominal size and lengths. The average moisture content based on 20 pieces selected at random per package was 36% with a standard deviation of 4%.

Figure 4: Production pieces and volumes

Package	Location	Thickness (inches)	Length (feet)	2x3	2x4	2x6	2x8	Wide flitches	Estimated Volume (fbm)
1	South	2	12	97	47	24			1246
2	North side	2	8, 10	70		56	4		867
3	North side	2	8, 10	7	182				1124
4	North side	2	12	25	54	69			1410
5	Mixed	1	12	23	38	20		14	682
								Total	5329

Figure 5: Moisture Content per lumber packages (green)

Package	Average MC %	High	Low	Standard deviation
1	34	41	30	2.6
2	37	51	27	5.4
3	37	43	23	4.4
4	38	52	33	4.8
5	35	40	30	2.4
All	36	52	23	4.3

In general the sawing of the wood was without incident and the boards produced were of a relatively good quality. Although the spiral grain was visibly present on the logs it did not present any particular problems for sawing nor generate any twisted or crooked boards. A few logs (approximately 2) with severe crook resulted in boards having sharp deflections. Two logs were rejected because of size (too small) and poor quality.

Variation in thickness and width was identified on many pieces of lumber. This is due primarily to inaccuracies associated with the equipment and is not believed to be a result of spiral grain.

The spiral grain was not observable on the boards after sawing. One piece generated from a log with excessive spiral grain resulted in angled stain as shown in the picture.

Figure 6: Picture showing spiral grain

Figure 7: Picture showing angled stain for the flitch of Figure 5

The lumber was then dried in a dehumidification kiln at the mill site for almost a week to a targeted moisture below 18%. The lumber was removed from the kilns when it was determined to be dry. During the processing of the lumber through the planer the moisture content of the dried 2” boards were sampled and resulted in average of 17% MC with a standard deviation of 3.2. Of the 80 measurements taken 26 were above 18% MC or the equivalent of 32%. This is very high percentage of wet wood and would not normally be accepted under standard grading rules. In reality, most sawmills will push the envelope to higher moisture contents such as 22%. In comparison, only 11% of the measurements exceeded this.

If the boards had of been dried to a much lower moisture content it would have been expected that more twisting would occur. In examining the 1” boards, that were also dryer because they were thinner, there was no evidence that twisting was more prominent.

Due to the significant sawing variation many pieces within the package were not in contact with the upper sticker placed between the rows. Because there was no weight on the board then the boards are allowed to twist as they are drying. It was expected that boards with significant spiral grain would result in twisted boards and that the clearance between the pieces this would cause even more twisting. Figure 8 shows the twisting boards.

Figure 8: Picture showing clearance due to sawing variation and resulting twisted boards.

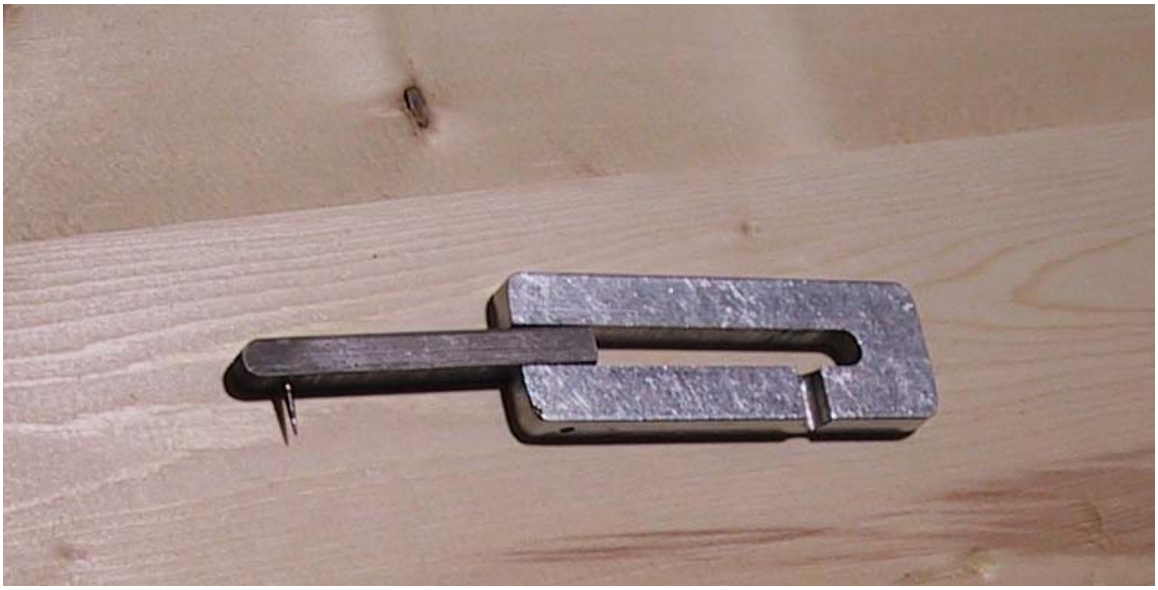
A weight was placed on the top of the package to maintain a load on the upper rows of boards to minimize twisting. Since the kiln is primarily used for short boards, the weights available were not sufficiently long for the wood in the sample packages and the top rows tended to result in more twisted wood as shown in Figure 9.

Figure 9: Picture showing twisted boards in top rows of package

The lumber was then planed by running one width at a time from several packages. The grading was performed by the local grading inspector and the pieces were hand stacked. The inspector typically took about 3 to 10 seconds per piece to determine the grade. Pieces in which the grade was uncertain were set aside to be revaluated later. There was ample time available to determine the proper grade. The lumber was graded according to the 2 and better and No. 3 grade rules.

The spiral grain, when noticeable or questionable, was evaluated using a small tool consisting of a hinged needle as shown in figure 10.

Figure 10: Picture showing tool for measuring spiral grain

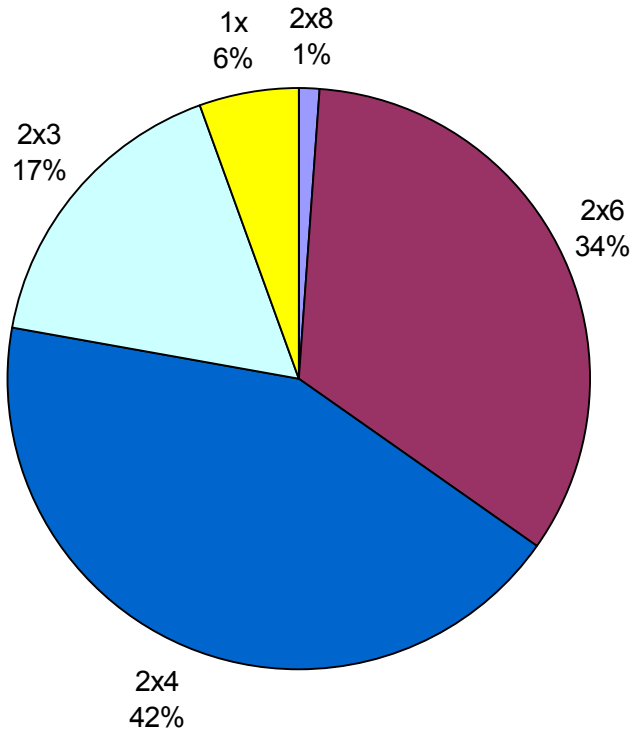


Results

Lumber Size Distribution

The lumber size distribution was characterized by a significant amount of 2x6 which is very encouraging in terms of flexibility in product size distribution. It was expected that the majority of the volume would be 2x4. The volume of 2x8 obtained was very small and not considered as statistically valid although it is an indicator of the potential log sizes available. The size distribution shown below, without the 2x8, was used in the modelling of the sawmill production.

Lumber Size Distribution by Volume

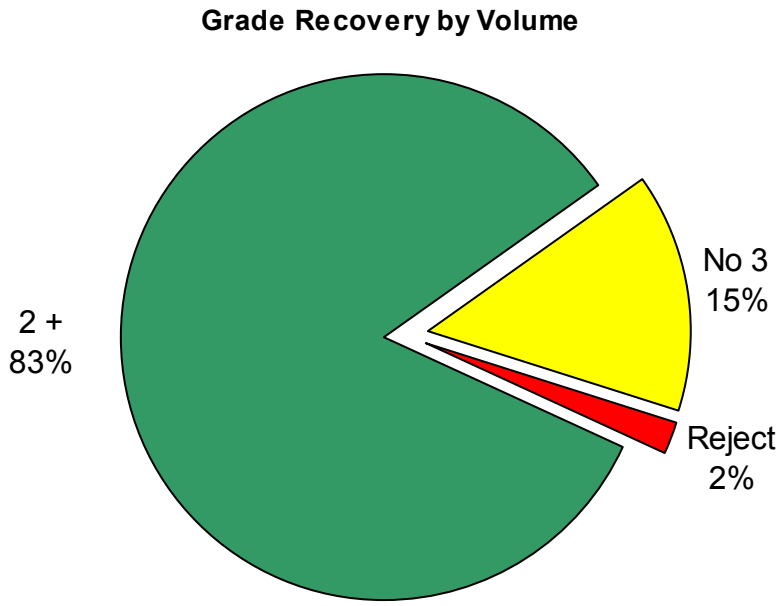


During the sawing portion of the trial the production of 2x6 was encouraged since twisting in wider boards due to spiral grain was expected to be more prominent. The production of 2x6 also is important due to the higher selling price and the fewer number of pieces that need to handled during production for an equivalent volume.

As well a certain number of 2x3 material were resawn into 1 inch pieces. Therefore the volume of 2x3 is slighted underestimated and the volume of 1x3 overestimated in comparison to what may possible in a normal operation. It is not expected that the difference in the results is greater than 2% on either of the products.

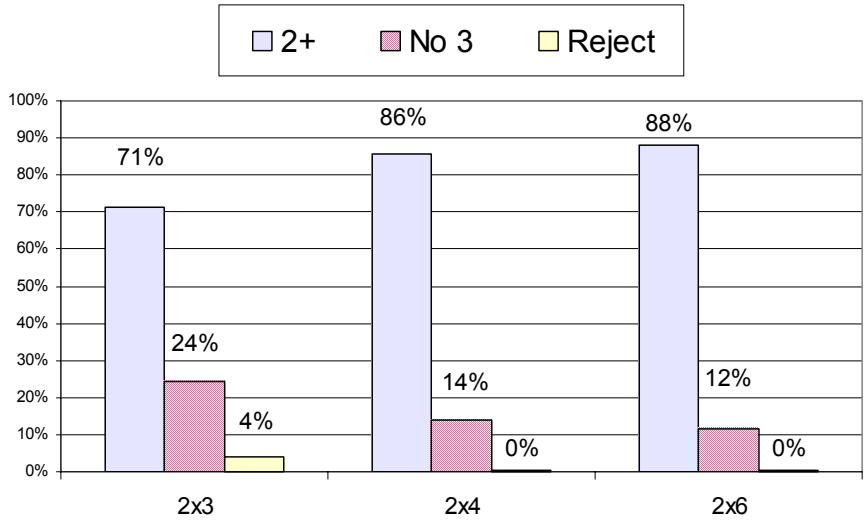
Grade Distribution

The grade distribution for all sizes of lumber resulted in 83% of all volume being a 2 and better grade (2+). The 2 and better volume includes the wood that was trimmed back in order to meet the grade. The trim ends were included in the reject volume.



Analyzing each of the products in more detail shows that the 2x4 and 2x6 had considerably more 2 and better grade than 2x3.

Grade Distribution per Dimension



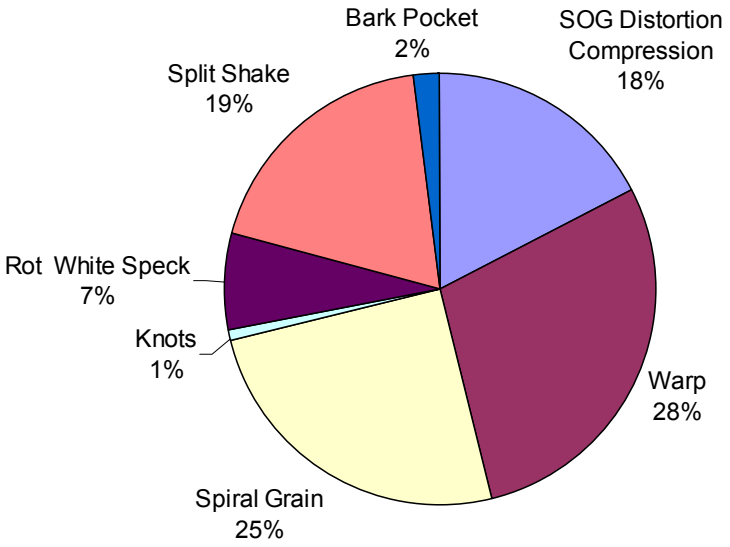
A portion of the 2+ volume generated was a result of pieces getting trimmed back in order to remove end defects. The proportion of trimbacks is illustrated in the table below.

Dimension	Total pieces	2+	2+ after trimming	No 3	Rejects
2x3	149	95	15	34	5
2x4	333	273	15	45	0
2x6	160	124	16	20	0
2x8	4	3	0	1	0

Downgrade Causes

The primary cause of the lumber downgrade was warp (bow, twist and crook). This can be greatly reduced by properly restraining the lumber as it is drying and was a concern previously mentioned in the test procedure.

Causes for #3 degrade



Pieces of Lumber per Downgrade Category

Dimension	No 3	Slope of Grain	Wrap	Twist	Crook	Spiral	Knots	Decay	Grain Distortion	Compression Wood	Split	Bark Pocket	Rot	White Speck	Shake
2x3	34	7	8	2	1	5	1	0	7	1	0	1	0	1	0
2x4	45	3	8	3	3	17	0	0	0	0	0	0	0	2	7
2x6	20	1	0	1	2	3	0	0	0	0	1	1	4	0	7

The second most significant cause for downgrade was spiral grain at 25% of the no. 3 pieces. The slope of the grain must not exceed 1 in 8 according to the grading rules for No. 2.

Isolating the frequency of spiral grain (25%) in terms of the no.3 downgrades (15%) results in an estimated 25% x 15% = 4% of all production will be downgraded due to spiral grain.

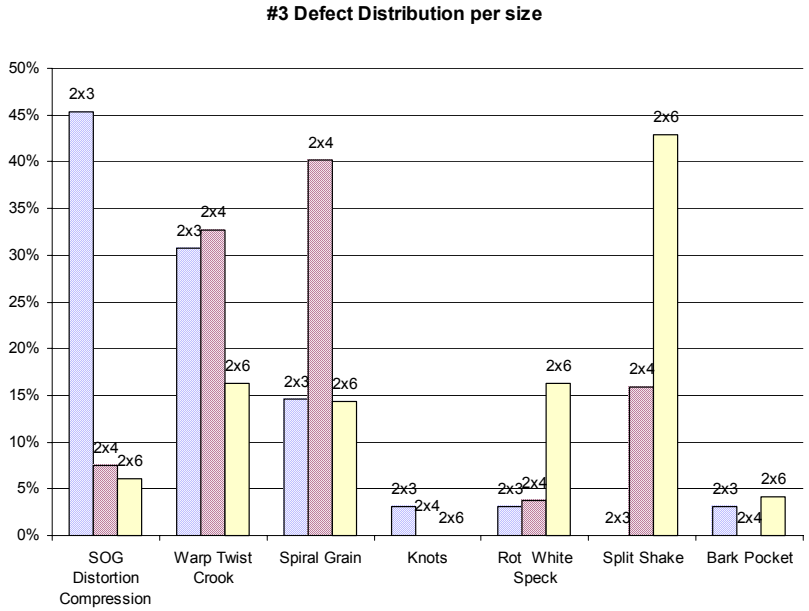
The spiral grain was frequently identified by angled stain or split (figure 11) or edge tear out (figure 12). When questionable, the spiral grain was identified using the tool (hinged pin) to mark the wood (Figure 13). The slope of grain was measured and compared with the grading rule.

Figure 11

Figure 12

Figure 13

The spiral grain was predominant in 2x4 whereas the 2x3 was subject to a high frequency of other grain related defects as shown in the graph below.



Conclusions

1. Spiral grain, severe enough to result in downgrade, was observed in approximately 4% of the total volume of finished pieces. This is not believed to be of a major concern in influencing the decision of building a sawmill.

2. Pieces with excessive spiral grain were within the limits of the No 3 grade. The lumber could then be sold at this lower grade or used in some of the secondary products.

3. During this study the grader used what ever amount of time (3 to 10 seconds or more) that was required to identify spiral grain in the pieces. Under normal operating conditions a grader would process up to 60 pieces per minute at less than 1 second per piece. It is there considered that, unless there are significant signs that spiral grain is present, most pieces with spiral grain are never noticed and are present in the market without the producer or consumer being aware of it. The impact of spiral grain is probably much less than the 4% identified in this study.

4. In response to concerns raised by other manufacturers processing logs with spiral grain

    - There were no issues identified that would be of concern when processing logs with spiral grain.
    - The cost of processing logs with spiral grain is not expected to be any different than logs with vertical grain
    - No logs or boards disintegrated while processing them
    - No damage to equipment from spiral grain pieces occurred or is expected
    - The yield obtained was 83% which is significantly greater than what is projected by others
    - The lumber appearance was very good and characterized by small tight knots that are attractive in specialty wood products
    - The color of the wood was not characterized by yellow staining nor did it appear “aged”. (this was probably due to poor drying by other manufacturers)

5. Of all the logs selected to be processed only two were rejected due to small diameter.

6. Of all the lumber produced only 5 pieces could not be planed due to excessive warp (2x3).

7. The product distribution is comparable or better than some sawmills that are situated in central Quebec. It is believed that the log sample is representative of the wood in

the area to be harvested but it is recommended that further study is done to confirm this.

8. The lumber inspector was not familiar enough with the grading of commons in the 1 inch material so this material was not processed or graded. In examining the boards it was apparent that there were no significant visual defects due to spiral grain, knots or warp that would result in a serious degrade issue.

APPENDIX

Equipment Used during trial

Equipment Used during trial

Sample logs

Sample of Spiral grain

Cants produced

Cants produced

Thin Flitches produced to be disposed of

Thick flitches produced for resawing

Side boards produced

Lumber produced

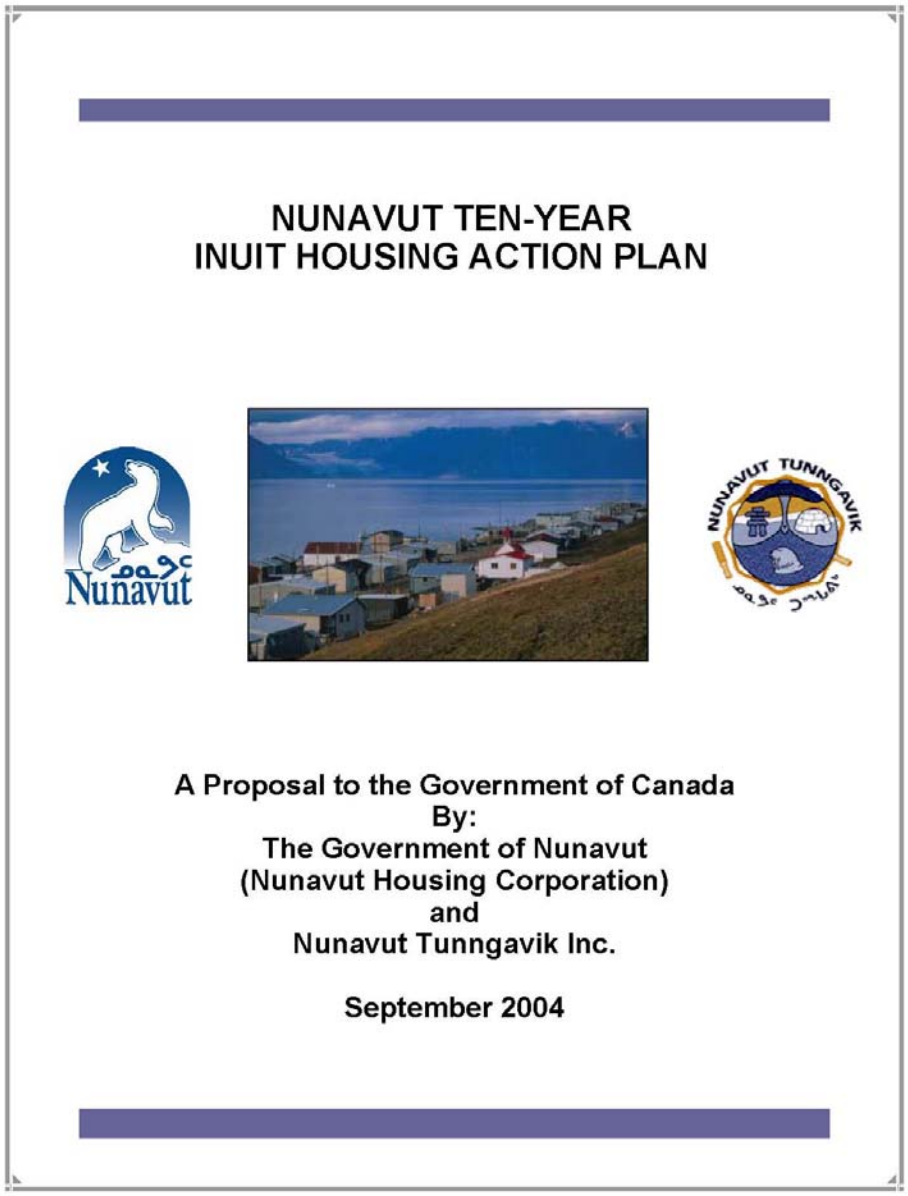
Packages #1 and 2

Packages #3 & 4

Package #5

Picture of typical dried lumber produced

B. NUNAVUT HOUSING STRATEGY – EXECUTIVE SUMMARY



NUNAVUT TEN-YEAR
INUIT HOUSING ACTION PLAN

Nunavut

NUNAVUT TUNNGAVIK

A Proposal to the Government of Canada
By:
The Government of Nunavut
(Nunavut Housing Corporation)
and
Nunavut Tunngavik Inc.

September 2004

EXECUTIVE SUMMARY

"....the conditions in far too many Aboriginal communities can only be described as shameful. This offends our values. It is in our collective interest to turn the corner. And we must start now."

The Right Honourable Adrienne Clarkson, Speech from the Throne, February 2, 2004

Nowhere in Canada is this statement illustrated more starkly than in Nunavut where adequate shelter has become a scarce resource rather than a basic right. National statistics tell the story: half of Inuit live in overcrowded conditions and 38.7% of them are considered in Core Need meaning they do not live in and cannot access acceptable housing. The Inuit of Nunavut are locked in a housing crisis that is worsening daily as the population booms and existing housing stock ages.

This crisis, building for more than a decade before the new Territory of Nunavut was founded, is not of the Government of Nunavut's making. With an annual budget less than half of the amount required to bring overcrowding down to the standard of the rest of Canada, the Government of Nunavut does not begin to have the resources to address the problem itself. Nevertheless, the issue cannot be ignored and, through the Nunavut Housing Corporation, the Government of Nunavut has strained its ability to address many other priorities by contributing $10 million annually (or 50 houses per year) over the past 5 years. All the data points to the same, unavoidable conclusion:

3000 Public Housing units are needed immediately just to bring overcrowding in Nunavut on a par with the rest of Canada.

A unique set of factors intersect in Nunavut that complicate the current housing crisis. A harsh climate, remote geography, extremely small population base, lack of road or rail access, underdeveloped infrastructure systems and the high costs of labour and materials combine to prevent the development of the kind of housing market which encourages private investment in southern Canada. Consequently, the creation of new housing supply is heavily dependent on public sector involvement.

Over 99% of public housing residents in Nunavut are Inuit and, with the shortage of housing such as it is, the only housing choice for many Nunavummiut is to add their names to the lengthy public housing waiting lists. For many people, this means years of waiting while multiple families live together and sleep in shifts within homes that average less than 1000 square feet.

In an effort to end this shameful situation, Nunavut Tunngavik Incorporated and the Government of Nunavut through the offices of the Nunavut Housing Corporation have joined together to develop this Ten-Year Inuit Housing Action Plan but we cannot do it alone.

A Call for Renewed Action:

Article 2 of the constitutionally protected Nunavut Land Claims Agreement clearly states that Inuit as Aboriginal Canadians are entitled to access to any federal programs or services intended for Aboriginal peoples. The Nunavut Ten-Year Inuit Housing Action Plan is a call to the Federal Government to honour its obligations to the Inuit of Nunavut with respect to social housing.

The Impacts and Benefits of Intervention:

Within Nunavut, a sustained ten-year intervention into the social housing crisis will, in addition to bringing overcrowding down to national standards, create:

- More experience, training and hours towards local trades certifications;
- Increased employment/income;
- Improved access to Employment Insurance for seasonal workers;
- Increased local community expenditures (local economic development);
- Increased community wealth;
- Reduced dependence on Income Support;
- Reduction of health and social problems linked to overcrowding such as family violence, high attrition rates and high rates of respiratory disease/tuberculosis;
- Increased community well-being through capacity building and empowerment; and
- Creation of a sense of ownership and pride through participation of local trades people.

A Ten-Year Action Plan for Inuit Social Housing:

The evidence from national, territorial and anecdotal data all lead to the same estimates of need for social housing for Inuit in Nunavut:

Crisis Relief	3000 New Units Constructed	**Reduce Nunavut overcrowding rate and core need.**
Crisis Relief	**1000 Existing Units Renovated**	Reduce overcrowding & improve long-term utility of units.
Forced Growth (2006 - 2016)	**2730 New Units Constructed**	Keep apace of Inuit population growth.

Total projected funding requirements (2006 - 2016) are approximately $1.9 billion.

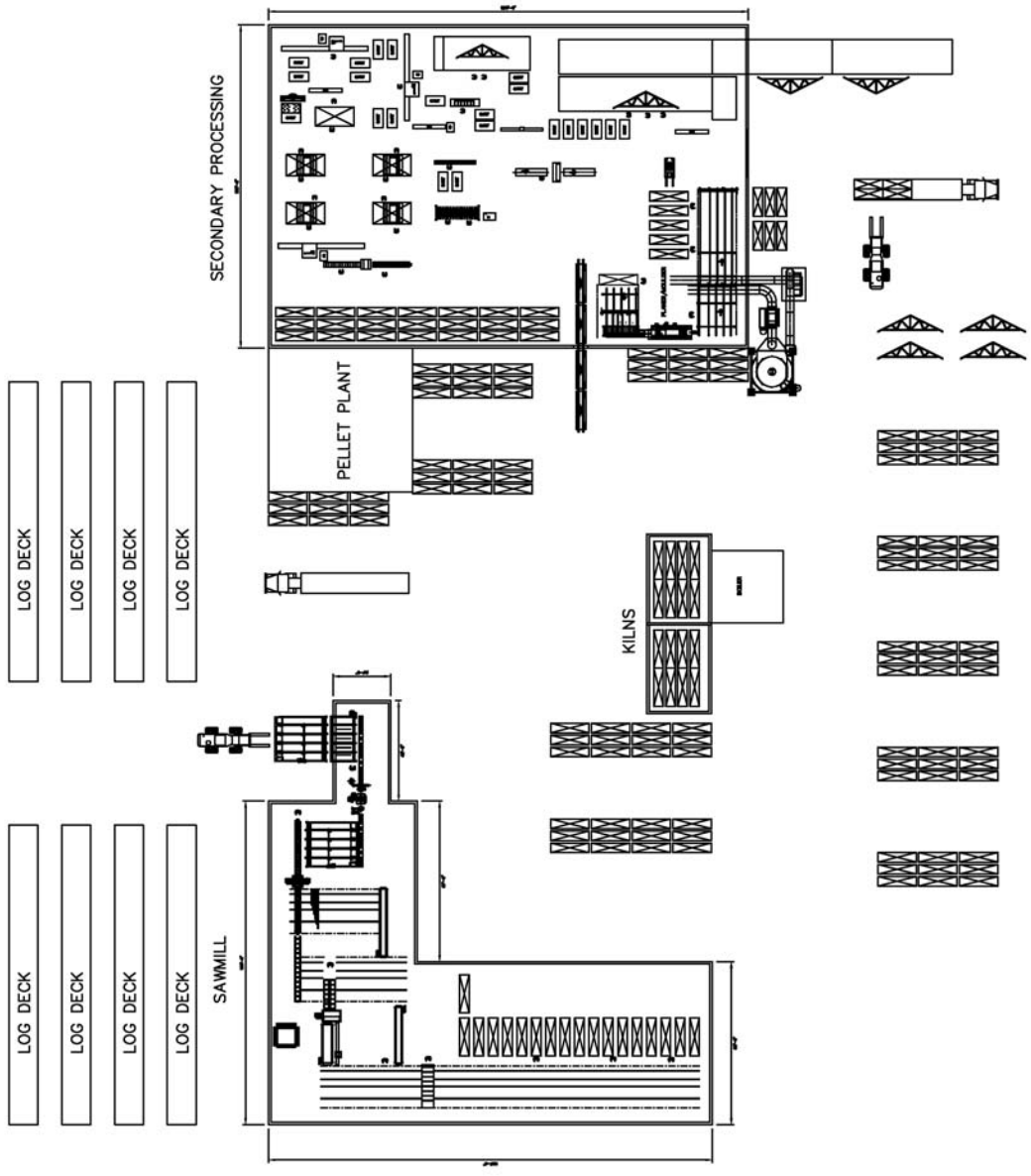
Accountability, efficiency and transparency to investors and the people of Nunavut is a cornerstone of the Action Plan. Key issues for discussion are:

1. The composition and establishment of a delivery model, which should include:
   a. A governance structure that remains true to the vision of the Action Plan and is based on a business model;
   b. A representative and knowledgeable Board of Directors that work to ensure due diligence, transparency and strict accountability;
   c. Representation from Nunavut Tunngavik Inc., Nunavut Housing Corporation, and other relevant organizations; and
   d. A mechanism to ensure that all funds are used for Inuit-specific housing.
2. Recognition of increased administrative requirements associated with preparation and construction over 10 years.
3. A commitment to efficiency by building on existing capacity and management systems wherever possible.
4. Recognition of increased demand upon local housing administration that will be created by the additional units.
5. Recognition of the need for sustainability beyond the 10 year Action Plan window.
6. The identification of objective indicators and timelines for regular progress reports to all partners of the Action Plan.

Conclusion:

Inuit in Nunavut are urgently in need of suitable, adequate housing. Nunavut Tunngavik Incorporated and the Government of Nunavut (through Nunavut Housing Corporation) propose that the Federal Government has responsibilities, pursuant to the Nunavut Land Claims Agreement and in keeping with recent statements made by the Governor General of Canada and the Prime Minister of Canada, to intervene into this escalating crisis in Nunavut. Through a partnership between the Government of Canada, the Government of Nunavut and Nunavut Tunngavik Incorporated, a long-term intervention can become a reality and Inuit can enjoy the same basic right to adequate shelter as all Canadians.

C. SITE LAYOUT FOR MANUFACTURING PLAN



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