MANNING DIVERSIFIED FOREST PRODUCTS LTD.

Monitoring and Research

2007 – 2017 Forest Management Plan for FMA 0200041

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Prepared by:
The Forestry Corp.

2007 – 2017 FMP FOR FMA 0200041

Monitoring and Research forms one of 10 sections of the 2007 – 2017 Forest Management Plan for Manning Diversified Forest Products Ltd.'s Forest Management Agreement (FMA) 0200041. The Forest Management Plan (FMP) includes the following sections:

1. **Introduction and Plan Development** – Introduces the companies operating on the FMA and describes the FMP development process, including the public consultation process. Includes the FMP Standards Checklist.
2. **FMA Area** – Describes the physical environment of the FMA Area.
3. **FMA Resources** – Describes the natural resources within the FMA Area.
4. **Values, Objectives, Indicators and Targets** (VOITs) – Details the values, objectives, indicators and targets that were instrumental in selecting the Preferred Forest Management Strategy and in developing forest management strategies for the FMP.
5. **Forest Landscape Metrics** – Presents specific information regarding forest vegetation composition and natural disturbance within the FMA Area and/or northwestern Alberta to address VOIT requirements.
6. **Landbase Netdown** – Provides a detailed description of the landbase netdown process, in preparation for the Timber Supply Analysis.
7. **Yield Curves** – Documents the volume sampling and yield curve development process.
8. **Timber Supply Analysis** – Describes how the Preferred Forest Management Strategy, which was selected to meet Values and Objectives, was incorporated into the Timber Supply Analysis and provides an Annual Allowable Cut for both the coniferous and deciduous landbases.
9. **Implementation** – Describes the forest management strategies and operations that will be used to implement the FMP and help ensure that indicators and targets are met.
10. **Monitoring and Research** – Describes monitoring commitments required to ensure indicators and targets are tracked and describes Manning Diversified's approach to supporting research.

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1. Introduction

The Forest Management Plan (FMP) is a long-term, forest-level plan that sets the general direction for forest management within the FMA for the FMP period (i.e., from May 2007 to May 2017). Successful implementation of the FMP relies on ongoing monitoring, to ensure that targets established for the FMP are attained. Monitoring is an important tool in adaptive forest management because it links forest management activities with their outcome. This ensures forest management techniques improve and also improves the ability to predict outcomes for forest management activities (which in turn, leads to improved forecasting).

MDFP is committed to implementing monitoring programs to track progress toward attainment of FMP targets, as well as to ensure efficacy of its forest management activities. Some of the monitoring programs are required to:

- meet regulatory requirements,
- meet FMP reporting requirements (Stewardship Report), or
- are voluntary and completed to provide additional information regarding Company management activities.

Manning Diversified also supports a variety of research initiatives relevant to the FMA Area. The research is diversified; from basic understanding of ecosystem functions to specific operational trials.

DMI, as a DTA holder within FMA 0200041, is required to conduct monitoring associated with regulatory requirements and to meet commitments within this FMP for its operations within P16 (i.e., P6 and P9). DMI may also complete additional voluntary monitoring to meet corporate objectives (the majority of DMI's operations within northwestern Alberta occur within DMI's FMA). DMI supports a variety of research initiatives, which will be described in the FMP for their FMA.

The following FMP sections outline the monitoring commitments associated with implementation of the FMP for FMA 0200041. It also outlines some of the research currently supported by MDFP. Monitoring programs associated with regulatory requirements are identified, but not described in detail, since they follow direction set by the Province.

2. Monitoring

2.1 Regulatory Requirements

A number of sampling and/or monitoring programs are undertaken to meet Provincial regulatory requirements.

2.1.1 Post-Harvest Block Inspections

ASRD requires that all harvest blocks be inspected after harvesting is completed to ensure compliance with Timber Harvest Planning and Operating Ground Rules (section 3.5 in **FMP Implementation**).

Harvest block inspections will be used to evaluate attainment of targets for the following FMP objectives:

Objective 1.1.1.6 Retain ecological values and functions associated with riparian zones.
Objective 3.1.1.1 Minimize impact of roading and bared areas in forest operations.
Objective 3.1.1.2 Minimize incidence of soil erosion and slumping.
Objective 3.2.2.1 Minimize impact of operations in riparian areas.
Objective 5.1.1.1 Establish appropriate AACs.

2.1.2 Scaling/Production Reporting

Timber production is determined through scaling programs. Scaling records, scaling sampling and production reporting requirements have been defined by the Province. It is each company's responsibility to submit the required reports to the Province.

2.1.3 Industrial Salvage Reporting

Forest tenure holders (i.e., FMA and quota holders) receive Timber Damage Assessment (TDA) from industrial activities that take place within their tenure areas. The Province requires the tenure holders report TDA timber returns. Manning Diversified, as the holder of FMA 0200041, is responsible for tracking industrial salvage on the FMA Area. Both the coniferous and the deciduous salvage components will be reported to the Province monthly by MDFP, using the Timber Return form (TM 7). TDA associated with the deciduous salvage component is collected by MDFP and remitted to the Province. MDFP, as the FMA holder, is responsible for reporting the species, volume, condition, volume produced and volume sold for both the deciduous and coniferous salvage, as part of its FMA and FMP commitment.

Salvage reporting is required to ensure timber removed from the FMA Area is consistent with approved AAC levels.

Industrial salvage reporting is a regulatory requirement but also addresses the following FMP objective:

Objective 5.1.1.1. Establish appropriate AACs.

2.1.4 Regeneration Surveys

The Planning Standard requires that all FMPs include development of Alternative Regeneration Standards (ARS). These will supercede Provincial Establishment and Performance Survey requirements. Manning Diversified has committed to undertaking development of Alternative Regeneration Standards and implementing ARS once it receives approval from the Province.

In the absence of an approved Alternative Regeneration Standard (ARS), the Province requires completion of two post-harvest surveys to ensure successful regeneration of harvested areas. Establishment surveys for conifer and mixedwoods must be conducted no sooner than 4 years and no later than 8 years after harvest (3 and 5 years respectively in deciduous stands). Performance surveys must be completed no sooner than 8 years and no later than 14 years after harvest in coniferous and mixedwoods and in conditionally stocked deciduous stands).

2.1.5 Silviculture/ARIS Reporting

The Province requires companies submit a silviculture report as part of their annual operating plan submission. The report describes silviculture operations undertaken, including reforestation and reclamation activities.

Companies are also required to meet annual Alberta Regeneration Information System reporting requirements.

Regeneration surveys and silviculture reporting will be used to evaluate attainment of targets for the following FMP objectives:

Objective 2.1.1.1 Meet reforestation targets on all harvested areas. Indicator A: Annual percent of Satisfactorily Restocked surveys. Indicator B: Cumulative percent of reforested areas that meet reforestation targets.

2.2 FMP Requirements

FMP monitoring requirements are identified in Section 2 of **Values, Objectives, Indicators and Targets**. The Stewardship Report is the primary document for reporting on FMP indicators and targets, although some are reported within other relevant reports/documents.

2.2.1 Variance

Variance Reporting ensures that the Spatial Harvest Sequence (SHS) is being adhered to, while allowing for minor adjustments to the harvest sequence or the harvest block boundaries. Flexibility is still required to deal with actual ground conditions and unforeseen circumstances.

The Variance Reporting protocol will be included as part of the Timber Harvest Planning and Operating Ground Rules for FMA 0200041. The protocol requires that all variances accounting for areas of 0.5 hectares or greater be reported and categorized as either deletions or deferrals. If compartment variance reaches 20% of the total SHS area for that compartment, further breakdown will be required. The detailed protocol is provided in Appendix I.

The Variance Reporting protocol is used to evaluate Targets for a large number of FMP Objectives.

Objective 1.1.1.1 Maintain biodiversity by retaining the full range of covertypes and seral stages.

Objective 1.1.1.2 Maintain biodiversity by avoiding landscape fragmentation. Indicator A: Range of patch sizes by FMU and for the FMA. Indicator B: Area of Old Interior Forest of each cover class by FMU and for the FMA.

Objective 1.2.1.1 Maintain habitat for identified high value species (i.e. economically valuable, socially valuable, species at risk, species of management concern). Indicator A: Area of suitable woodland caribou habitat within the FMA. Indicator C: Existing habitat for trumpeter swan. Indicator E: Existing habitat for northern pikeminnow.

Objective 1.4.1.1Bioloigically significant sites are identified within management and operational planning processes and forest management strategies incorporate protective measures. Indicator A: Protection of the Notikewin River Valley.

Objective 3.2.1.1 Limit impact of timber harvesting on water yield.

Objective 5.1.1.1 Establish appropriate AACs.

Objective 5.2.1.1 To reduce wildfire threat potential by reducing fire behaviour, fire occurrence, threats to values at risk and enhancing fire suppression capability. Indicator B: Percentage reduction in Fire Behaviour Potential area (ha) across the FMA area now and over the planning horizon.

2.2.2 Structural Retention

Structural retention reporting is described in detail in the Structural Retention Strategy (section 3.4 and Appendix IV in **FMP Implementation**).

Structural retention reporting is used to evaluate attainment of the target relating to the following objective:

Objective 1.1.2.1 Retain stand level structure. Indicator A: The percentage area of residual structure (both living and dead) within a harvest area, representative of the status (live/dead), sizes and species of the overstorey trees by FMU and FMA.

2.2.3 Downed Woody Debris

Downed woody debris reporting is introduced briefly in section 7.1.6 in **FMP Implementation**. A detailed description of the protocol is provided in Appendix II of this document.

Downed woody debris reporting is specific to the following objective:

Objective 1.1.2.1 Retain stand level structure. Indicator B: Percentage of harvested area, by compartment, with downed woody debris equivalent to pre-harvest conditions.

2.2.4 Forestry Roads

As part of their FMP commitment, Manning Diversified is required to report on forestry roads within the FMA Area. The protocol the Company will use to report on forestry roads (i.e., MDFP and DMI roads, being utilized for forestry-related activities) is described in Appendix III.

Road reporting is specific to the following objective:

Objective 1.1.1.3 Maintain biodiversity by minimizing access. Indicator A: Open all-weather forestry road density by FMU. Indicator B: Open seasonal/temporary forestry road length for the FMA.

2.2.5 MDFP Non-road Clearings

As part of their FMP commitment, Manning Diversified is required to report on any non-road clearing undertaken by the Company. The Company rarely clears for non-road purposes and will simply track and report any areas cleared.

Reporting of non-road clearings is required to evaluate the target for the following objective:

Objective 2.1.2.1 Limit conversion of productive forest landbase to other uses. Indicator B: Amount of permanent clearings.

2.2.6 Timber Salvage

If timber salvage operations are undertaken during the term of the 2007 – 2017 FMP, Manning Diversified has made a commitment to retain and report on unsalvaged areas. The protocol to be used for reporting will be determined in consultation with ASRD based on salvage conditions and circumstances (i.e., size of salvage operation, number of companies involved, etc.).

Salvage reporting is required to evaluate the target for the following objective:

Objective 1.1.1.5 Maintain unique habitats provided by wildfire and blowdown events. Indicator A: Area of unsalvaged burned forest. Indicator B: Area of unsalvaged blowdown.

2.2.7 Watercourse Crossings

The protocol for monitoring watercourse crossings within the FMA is described in MDFP's Road Planning, Construction, Maintenance, Reclamation and Monitoring Strategy (section 2 and Appendix I in **FMP Implementation**).

Watercourse crossing monitoring is required to evaluate the target for the following objective:

Objective 1.1.2.3 Maintain aquatic diversity by minimizing impacts of water crossings.

2.2.8 Insect and Disease

ASRD is responsible for conducting surveys to determine the extent of insect and disease infestations within the Province. An insect and disease reporting protocol has not been developed for FMA 0200041, since the responsibility lies with the Province. MDFP will however, summarize any information made available from ASRD regarding pathogen outbreaks within the FMA in the Stewardship Report.

Insect and disease reporting is required to evaluate the target for the following objective:

Objective 2.1.2.2 Recognize lands affected by insects, disease or natural calamities.

2.2.9 Other

Numerous FMP objectives have targets and indicators that are not quantitative and do not lend themselves to a formal monitoring protocol. These indicators and targets will simply be evaluated every five years, in the Stewardship Report.

Objectives which fall into this category include:

Objective 1.1.1.4
Objective 1.1.2.2
Objective 1.2.1.1 Indicator B, Indicator D
Objective 1.2.1.2. Indicator A, Indicator B, Indicator C
Objective 1.3.1.1
Objective 1.3.1.2
Objective 1.4.1.1 Indicator B
Objective 1.4.2.1
Objective 2.1.2.1 Indicator A
Objective 2.1.3.1
Objective 4.1.1.1
Objective 5.2.1.1 Indicator A
Objective 5.2.2.1 Indicator C, Indicator D, Indicator E
Objective 5.2.2.2 Indicator A, Indicator B
Objective 6.1.1.1 Indicator A, Indicator B
Objective 6.1.1.2

Objective 6.2.1.1

2.3 Growth and Yield Program

A Growth and Yield Program was developed for the FMA as part of the 2007 – 2017 FMP. The Program identifies the sampling programs that will be used to provide data suitable for:

- Meeting desired future model development initiatives;
- Monitoring special assumptions made in current yield estimation; and
- Satisfying any specific approval decision criteria associated with the current FMP.

The focus of the Growth and Yield Program is twofold:

1. **Standing timber growth and yield modelling.** Comprised of both a PSP and TSP component to address the needs for growth and yield modelling (from empirical yield curves to complex growth and yield models), as well as landscape-level monitoring of growth and yield characteristics.

2. **Post-harvest growth and yield monitoring**. Comprised of PSPs as well as regeneration surveys to capture current information on existing stands as well as to develop models to project these stands into the future.

The Program builds on MDFP's existing PSP framework and protocol. The Growth and Yield Program is provided as Appendix IV.

The Growth and Yield Program also provides the data necessary to, over time, evaluate the following objective:

Objective 5.2.3.1 Regenerated stand yield compared to natural stand yield.

3. Research

3.1 Manning Forestry Research Fund

Manning Diversified Forest Products Ltd. has been funding research through the Manning Forestry Research Fund since 1995. Since that time, the Research Fund has contributed in excess of $5.6 million for research projects in Alberta.

The mission of the Manning Forestry Research Fund is to support research which furthers understanding of the boreal forest and sustainability of the social, cultural, and economic values in the Northwest boreal region of Alberta. The Research Fund supports a wide range of environmental studies including: fish and wildlife inventories, silvicultural studies, forest product development, forest education, and career training.

Approximately 110 different research projects have been supported to-date. Organizations receiving support include: The University of Alberta, Alberta Research Council, Canadian Forest Service, Alberta Environment, North Peace Applied Research Association, Envirothon, Boreal Forest Research Centre, and the Alberta Conservation Association. Listings of research projects funded, along with associated publications, are available on the Research Fund's website (http://www.mdfpresearch.ab.ca/index.htm). Several examples of past research are provided below to indicate the diversity of the research that is supported by the Research Fund:

- Dynamic of young mixedwood stands in Alberta
- Cooperative Fisheries Inventory Program
- Developing operational guidelines for integrating conservation of avian diversity into forest management
- Sustainability of Alberta's Boreal Forest Region: The integration of economic, ecological and human concerns
- Impacts of logging on boreal birds in the mixedwood forest

- Regeneration niche of white spruce in the mixedwood boreal forest of Alberta following natural disturbance
- Effects of fire versus harvest disturbance on bird and vegetation diversity in conifer dominated boreal mixedwood forest
- Biodiversity in cutblocks with few large versus many small residual patches of trees and snags
- The role of boreal forests and forestry in the global carbon budget
- Assessment of wolverine densities and monitoring methodology in boreal Alberta.

Although Manning Diversified provides financial support to the Research Fund, the Company is not directly involved in project funding decisions (i.e., the two entities operate at arms length).

3.2 Foothills Model Forest

Manning Diversified is a Management Partner with the Foothills Model Forest. The Foothills Model Forest is a unique partnership dedicated to providing practical solutions for stewardship and sustainability on Alberta forest lands. The organization's vision is to see it's learning:

- reflected in on-the-ground practice throughout Alberta and elsewhere in Canada, where applicable
- incorporated in forest and environmental policy and changes
- widely disseminated to and understood by a broad spectrum of society.

Through its involvement with the Foothills Model Forest, Manning Diversified has supported a variety of research initiatives, including research related to:

- natural disturbance regimes
- grizzly bear habitat mapping and resource selection monitoring
- climate change.

Appendix I Variance Reporting

FMA 0200041

VARIANCE REPORTING

All variances in FMA 0200041 will be reported as per this protocol. The company that harvests a cutblock is responsible for calculating and reporting the variance to Alberta as planned in a Final Harvest Plan (FHP) as well as the actual variance after completion of harvest in the annual as-built plan. The companies must also provide an annual summary of planned and actual variance to MDFP for inclusion in the FMA Stewardship Report (5 year reporting).

DEFINITIONS

Variance - Area of a Spatial Harvest Sequence (SHS) polygon deleted from the net landbase or deferred from the approved harvest sequence.

Deletion - Area permanently removed, by the Companies, from the net landbase after the approval of the SHS. Land use withdrawals from the FMA landbase (i.e., roads, pipelines, well-sites) are not considered deletions and do not contribute to variance.

Deferral - Area delayed from the approved 10 year SHS for operational or inventory reasons with the intention that they will eventually be harvested.

Additions - Area not part of the 10 year SHS that is added to the SHS. Area can only be added to the SHS during layout when an equal or greater amount has been deleted or deferred and tracked as variance. Total harvested area plus the area remaining to harvest cannot exceed 100% of the SHS area per compartment without triggering a possible appraisal of the Final Harvest Plan.

Compartment - Subunits of an FMU delineated by environmental, operational or watershed characteristics. The compartments FMA 0200041 are depicted on the twenty year spatial harvest sequence map in the Timber Supply Analysis section of the FMP.

Sliver Polygon - A cut or uncut area which is less than 0.5 ha. in size. The area must be adjacent to or part of a cutblock. These do not contribute to the compartment variance.

PLANNED VARIANCE

Planned variance, in hectares, will be reported in the FHP. Planned variance will be reported for all areas 0.5 ha or greater (areas less than 0.5 hectares and adjacent to cutblocks are considered slivers and are not tracked as variance). Areas will be categorized as either a deletion from the net landbase, a deferral from the first 10 year SHS or an addition to the harvest area. If compartment variance reaches 20% of the total SHS area for that compartment, further breakdown as per section 4.1.1 of the Timber Harvesting and Operating Ground Rules for FMA 0200041 will be required prior to acceptance by Alberta.

ACTUAL VARIANCE

Actual variance (in hectares) will be reported by compartment in the annual as-built plan and summarized in the Stewardship Report by strata and compared to the SHS. Actual variance will be reported for all areas 0.5 ha. or greater and categorized as per section 4.1.1 of the Timber Harvesting and Operating Ground Rules for FMA 0200041.

SLIVER POLYGONS

A post harvest area summary, in hectares, of sliver polygons categorized as additions or deletions will be reported in the annual as-built plan. This will be provided for information and comparison purposes and will not contribute to the compartment variance. Where this summary shows large discrepancies in added or deleted slivers, Alberta may require further analysis of the sliver areas.

Appendix II Downed Woody Debris Monitoring

FMA 0200041

DOWNED WOODY DEBRIS MONITORING

The Downed Woody Debris Monitoring protocol for FMA0200041was developed to determine the percentage of harvested area, by compartment, with downed woody debris (DWD) equivalent to pre-harvest conditions, as required to meet Objective 1.1.2.1, Indicator B.

BASELINE DATA USED TO ESTABLISH PRE-HARVEST CONDITIONS

The baseline data was collected through the PSP process using gross landbase. This data was broken down into age classes (based on stand age) approximating seral classes. This data was then analyzed using decay and diameter classes. Since decay class 4 and decay class 5 are neither removed from the site nor can they be immediately replaced through harvesting operations, and since they cannot be measured during winter conditions, they were removed from the dataset (refer to Appendix 1 for decay classes).

The landbase on FMA0200041 is divided into deciduous and coniferous landbase. Therefore two targets are proposed, one for each landbase. Coniferous harvesting typically occurs in stands in the 101^{+} years category, while deciduous harvesting occurs in stands greater than 60 years. These minimum ages were used to establish the DWD targets.

The process for collecting the data during the PSP establishment was as follows: a 30 m (horizontal distance) straight line transect with the plot center as the reference (15 m on one side of the center and 15 on the other) was established. The information was collected in diameter classes by species. Species diameters of 5 cm or less were not tallied. This data was collected for every PSP completed.

CUTBLOCK MEASUREMENTS

It is proposed that the cumulative diameter size be represented as a length and then be measured against total transect length to get a percentage of total transect length. For example if 3 pieces of debris were encountered and their diameters were 30 cm, 20 cm, and 10 cm then the total length is 60 cm. On a 30 meter transect this means that DWD is 2% of the transect area (0.6m ÷ 30m).

Using basic statistics and PSP data that met minimum age requirements, the following diameter length per 30 meters of transect was determined.

Landbase	Age Class (Stand Age)	Average Diameter Total (cm)	Percentage of transect	Number of Plots
Coniferous	101^{+}	93.1	3.1	113
Deciduous	60^{+}	50.3	1.7	35

Data used to determine the targets are provided in Appendix 2.

DESIGN

MDFP proposes to sample every fifth block harvested for Downed Woody Debris. These blocks will be chosen in order of harvest with the first block feller bunched being the first block chosen. It is proposed that 1 triangular transect be completed for every fifth block harvested. The measurement location plus 2 alternate locations will be randomly determined prior to measurement (see Appendix 3 for detailed sampling protocol). A equilateral triangular transect with 10 meter sides is proposed to account for any linear distribution of slash. The downed woody debris will be categorized into diameter classes as indicated in Appendix 3.

Because DWD provides habitat for animals as well as contributes to nutrient cycling (biotic and abiotic benefits), MDFP proposes to do the measurements after harvest(skid clearance) and debris piling but prior to scarification. If any part of the plot falls on a road, decking area, or brushpile it will be moved as per Appendix 3.

ANALYSIS AND DATA SYNTHESIS

After the transects are measured, the goals will be considered met if the percentage of harvested area, by compartment, with downed woody debris equivalent to pre-harvest conditions meets the FMP target for objective 1.1.2.1 Indicator B. The results will be presented in the Stewardship Report and there may be a reevaluation of the program at that time. MDFP will assess the field measurement methods and protocols yearly for the first 5 years to refine the measurement protocols.

APPENDIX 1

DOWNED WOODY DEBRIS DECAY CLASSES

	Class 1	Class 2	Class 3	Class 4	Class 5
Wood Texture	Intact, hard	Intact, hard to partly decaying	Hard, large pieces, partly decaying	Small, blocky pieces	Many small pieces, soft portions
Portion on Ground	Elevated on support points	Elevated but sagging slightly	Sagging near ground, or broken	All of log on ground, sinking	All of log on ground, partly sunken
Twigs<3cm (if originally present)	Present	Absent	Absent	Absent	Absent
Bark	Intact	Intact or partly missing	Absent to trace	Absent	Absent
Shape	Round	Round	Round	Round to oval	Oval
Invading Roots	None	None	In sapwood	In heartwood	In heartwood

APPENDIX 2

DOWNED WOODY DEBRIS PLOT DATA

Coniferous Landbase PSP's

	Age Class	Plot	Cumulative Diameter
CONIF	101-140	4	94.5
		7	10.5
		9	10.5
		10	21.0
		12	21.0
		13	94.5
		14	94.5
		15	84.0
		19	10.5
		34	42.0
		37	151.2
		38	63.0
		41	168.0
		45	63.0
		47	115.5
		54	231.0
		60	94.5
		62	73.5
		63	707.0
		64	136.5
		70	54.3
		74	73.5
		76	0.0
		82	31.5
		85	140.7
		86	94.5
		87	126.0
		89	152.2
		111	31.5
		116	52.5
		117	0.0
		122	203.1
		126	214.8
		135	136.5
		139	21.0
		143	43.1
		144	192.9
		145	10.5
		151	31.5
		153	31.5
		154	96.6
		159	141.4
		160	114.5
		164	0.0
		165	0.0
		166	21.0
		167	216.8
		169	43.8
		174	0.0
		176	31.5
		182	62.5
		186	32.6
		187	97.3
		189	10.5
		195	94.5

Coniferous Landbase PSP's

	Age Class	Plot	Cumulative Diameter
CONIF	140+	5	156.4
		24	160.3
		90	21.0
		137	21.0
		168	161.2
		178	42.0
		183	42.0
		184	64.1
		192	197.2
		194	436.7
		200	243.7
		201	109.8
		236	73.6
		271	150.7
		286	129.3
		288	42.0
		362	345.0
		364	84.0
		376	102.5
		555	118.2
	140+ Total		**2700.3**

Deciduous Landbase PSP's

	Age Class	Plot	Cumulative Diameter
DECID	101-140	36	65.3
		61	244.9
	101-140 Total		**310.2**
	61-100	21	105.0
		23	108.3
		75	0.0
		124	210.0
		140	10.5
		163	97.2
		220	224.0
		387	63.0
		527	21.0
		570	43.1
		574	21.0
		604	0.0
		605	10.5
		618	43.8
		623	73.5
		627	21.0
		634	64.1
		638	41.5
		639	0.0
		666	42.0
		675	0.0
		676	21.0
		681	0.0
		699	0.0
		712	21.0
		768	0.0
		843	41.5
		859	0.0
	61-100 Total		**1283.0**

cont'd	Age Class	Plot	Cumulative Diameter
	101-140	202	10.5
		206	203.1
		208	73.5
		209	84.0
		212	65.1
		216	188.4
		221	152.3
		242	126.0
		249	75.8
		250	84.0
		251	0.0
		259	94.5
		263	52.5
		284	141.7
		285	76.4
		292	221.9
		293	63.0
		294	178.5
		303	0.0
		304	21.0
		308	85.8
		309	131.2
		326	269.0
		336	171.4
		350	43.1
		373	10.5
		381	74.1
		386	53.4
		543	0.0
		569	127.7
		614	43.1
		694	10.5
		862	0.0
	101-140 Total		**7823.0**

APPENDIX 3

DOWNED WOODY DEBRIS FIELD MEASUREMENTS

INTENT

The measuring of the downed woody debris is a requirement of Annex 4 of the Planning Manual. This protocol is meant to be applied to blocks harvested in FMA0200041.

TIMING

Downed woody debris can add either organic matter or provide habitat for fauna. Therefore a measurement of the woody debris should be done to accurately measure all potential debris. This should be done post skid clearance and brush piling, but prior to scarification (as there may be some burying of DWD). In some instances it may not be possible to meet this timeline. If this is not possible then measurements may need to be done post scarification. If these options are not feasible, the plots will be done the following summer.

BLOCK SELECTION

It is proposed that 20% of the blocks harvested will be sampled. This will be separated by deciduous and coniferous landbase. The blocks will be chosen in order of harvest with the first block feller bunched chosen. Every fifth block will then be chosen. It is proposed that every chosen block will get 1 triangular transect.

PLOT LOCATION

There will be 3 plots randomly located prior to harvest and a gps location will be assigned for the northpoint of each the plots. 1 plot will be the intended plot location, however if that plot falls in a non-representative area, then there will be 2 alternates. The plot should then follow one of the following 2 methods to get an equilateral triangle. Either A) Proceed 10 meters at 135 degrees measuring DWD then 10 meters at 270 degrees and finally 10 meters at 45 degrees or B) Proceed 10 meters at 225 degrees, 10 meters at 90 degrees and finally 10 meters at 315 degrees. All distance needs to be corrected for slope, so that all measured lines are horizontal distance.

The measurement should be done with a topofil or measuring tape and a compass corrected for true north (use the appropriate declination).

OFFSETTING PLOTS

In some cases the randomly located plot may fall in an area that should not be measured. Such areas include roads, deck areas, top/limb piles etc, retention patch, creek buffers, creeks or campsites. If for any reason a plot falls in an area that would not give a true representation of block slash load, there will be 2 additional alternate plots selected prior to harvest to account for this. All 3 plots will be ranked in the order that they will be taken. If there is still a problem with the plot location then the plot should be offset. The plot should be offset in the direction where

the block looks the longest. Offset the plot 30 meters along the long access of the block until the plot is not on a debris pile or road.

DEBRIS MEASUREMENT

The debris will be measured to diameter classes. The diameter classes are as follows:

Class	Description
1	6-15 cm
2	16-25 cm
3	26-35 cm
4	36-45 cm
5	46-55 cm
6	>56cm

RULES FOR CONSIDERING DOWNED WOODY DEBRIS

Not all woody debris is valid to be tallied, or tallied more than once. Downed woody debris will include:

- Woody pieces at least 6 cm in diameter at the point where the sampling line crosses the debris
- Uprooted stumps at least 6 cm in diameter at the crossing point and any of their exposed dead roots 6 cm in diameter or greater at the crossing point
- Downed horizontal or suspended (not self supporting) dead tree boles
- Fallen trees which still have green foliage if they no longer have roots attached to the ground to keep them alive
- Tops broken off of standing live trees or snags

It does not include:

- dead branches still attached to standing trees
- rooted stumps
- exposed roots of self supporting trees or stumps
- material that is buried beneath organic or mineral soil layers, or has decomposed enough to become part of the forest floor
- self supporting live or dead (still rooted) trees.

To facilitate checking each piece measured should be marked with paint if desired by the local forest office. If no downed woody debris is encountered then a tally card should be filled out with 0.

TALLY CARD

The tally card will record the following information:

- Date

- Timing (as per timing above)
- Surveyor (initials)
- License (FMA number)
- Block
- Diameter class

Date:	Timing:	Surveyor:
License:	Block:	Comments:
Piece Number		**Diameter Class**

Appendix III Road Reporting Protocol

FMA 0200041

ROAD REPORTING PROTOCOL

The purpose of this protocol is to determine, on an annual basis, how many kilometers of forestry roads are open within the FMA Area. This protocol is specifically designed to evaluate whether Targets associated with FMP Objective 1.1.1.3 are being met (for Indicators A and B). Indicator A addresses open all-weather forestry road density, while Indicator B addresses open seasonal/temporary forestry roads. Attainment of Targets will be formally reported every five years in the Stewardship Report.

TYPES OF ROADS

For the Road Reporting Protocol, three types of roads considered.

In-block roads are roads used to haul wood from blocks. Typically wood is skidded to landings alongside the road, then hauled. Generally, these roads undergo some form of permanent reforestation/reclamation (e.g., tree planting). In-block roads are not included in Objective 1.1.1.3 and are therefore not included in the Road Reporting Protocol.

AOP roads are roads that are approved under AOPs for forestry applications. They generally are roads that move wood between blocks and a semi-permanent or permanent road system (e.g., a disposition or LOC road). They are expected to be of short duration (e.g., less than 5 years). They are often referred to as seasonal or temporary roads. These roads are included in the Road Reporting Protocol.

Disposition roads (e.g., an LOC roads, RDS, etc.) are roads that are expected to have a long lifespan (e.g., greater than 5 years). Any disposition roads held by forestry companies are included in the Protocol.

OPEN FORESTRY ROADS

To be eligible for inclusion in the Road Reporting Protocol, roads must be open at some time during the timber year and meet the following requirements:

- Roads that are specifically opened by a forestry company or used for forestry that are not covered under other user's disposition (e.g., oil and gas LOCs, RDSs, etc.).

- Roads held under LOC (i.e., non-AOP roads) by forest companies (MDFP or DMI) that are opened by other users via road use agreements with forest companies (regardless of whether the road is used by a forest company or other user (e.g., oil and gas)).

Roads not included under the protocol include:

- Provincial or Municipal or roads where the LOC belongs to a company other than MDFP or DMI are not included in the Reporting Protocol.

- Roads that have a reclamation certificate unless they are reopened specifically for forest company purposes.

The Protocol will include roads within the FMA Area only. For example, if harvesting operations are undertaken in FMU P15 (MDFP's quota area), roads used to haul the wood through the FMA Area are included, however the roads within P15 (outside the FMA Area) are not included.

TIMING

Calculating the length or density of roading will be done on an annual basis, based on the timber year (i.e., May 1 to April 30). It will include forestry roads that have been opened at any time during the year. Results will be reported every five years as part of the Stewardship Report.

SPECIAL CONSIDERATIONS

Because the Canfor road is used continually to access the Sutton plant/oilfield, it will automatically be included annually in the calculations.

Appendix IV Growth and Yield Program

The Forestry Corp. Project Number: P444
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