

# Alberta-Pacific FMA Area Landbase Determination Process



ALBERTA-PACIFIC  
FOREST INDUSTRIES INC.



**Vanderwell**  
Contractors (1971) Ltd.

**Alberta Plywood Ltd.**



Prepared for:

**Alberta-Pacific Forest Industries Inc.**  
P.O. Box 8000  
Boyle, Alberta  
T0A 0M0

(Completed May 2003)



Prepared by:

**Timberline Forest Inventory Consultants Ltd.**  
Suite 315, 10357 - 109th St.  
Edmonton, AB  
T5J 1N3



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## 1 Landbase Determination

The landbase determination process was used to define the net landbase currently available for timber harvesting, based upon the current set of operating ground rules and the most up-to-date landbase exclusions. This process can be expected to change in future analyses as newer data and improved methods become available. Alberta-Pacific Forest Industries Inc. (Alberta-Pacific) adopted the Alberta Interim Forest Management Planning Manual<sup>1</sup> as a guide for determining the net harvestable landbase available for timber harvesting.

Three broad classes of exclusion types were identified through the landbase determination process:

- Forest that prohibits timber harvesting (Section 1.2);
- Inoperable or isolated stands (Section 1.3); and
- Operating Ground Rules<sup>2</sup> (Section 1.4).

These exclusion types were used to provide the framework for the landbase determination process, with subsequent steps integrating recent stand-level disturbances and more site specific modeling information. The resulting database was used to initiate the forest modeling process.

Alberta-Pacific is committed to estimating both deciduous and coniferous AACs. In circumstances where portions of an FMU extend beyond the FMA boundary, the area outside the FMA must be included in the conifer AAC estimate. This area, referred to as 'Non-J' area, must go through a landbase determination process. Differences between inventories existing inside and outside the FMA make it impossible for one process to address both landbases. To address this, Alberta-Pacific chose to modify the FMA landbase determination process to support inventories within the 'Non-J' portions of each FMU. A Phase 3 Landbase Determination process was developed and used for 'Non-J' area where AVI was not available (see Appendix 1).

The remainder of this document presents specific details on methods used to address exclusion types for the FMA (J) area. The final netdown FMA area summary is presented in Section 1.8.8 (Table 1-19) of this document. Unit level summaries (FMU and/or Timber Zone) along with associated netdown maps are presented in Appendix II.

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1 Alberta Environmental Protection - Lands and Forest Services. 1998. Interim Forest Management Planning Manual Guidelines to Plan Development; Supplemental Guidelines – Timber Supply Analysis Documentation Requirements. Edmonton, Alberta, Canada. pp6.

2 Alberta-Pacific Forest Industries. 2000. Alberta-Pacific's Operating Ground Rules. Boyle, Alberta, Canada. pp97.

### 1.1 Inventory Background

The current FMA area AVI used for the analysis was based on 1:15,000 black and white photography taken between 1992 and 2001. The landbase determination will only be performed on FMUs where approved AVI exists. Since 1992, the inventory has been updated to reflect recent harvest depletions (Table 1-1). Additional landbase depletions (harvesting, fire, oil & gas activity) not accounted for in the base inventory were integrated into the modeling process through thematic overlays, as described in Section 1.5: Integration of Recent Landscape Disturbances.

'Non-J' inventory has originated from a variety of sources, as shown in Figure 1-2 & Table 1-2. There is a significant amount of 'Non-J' area where AVI is incomplete, leaving Phase 3 data as the alternative inventory.

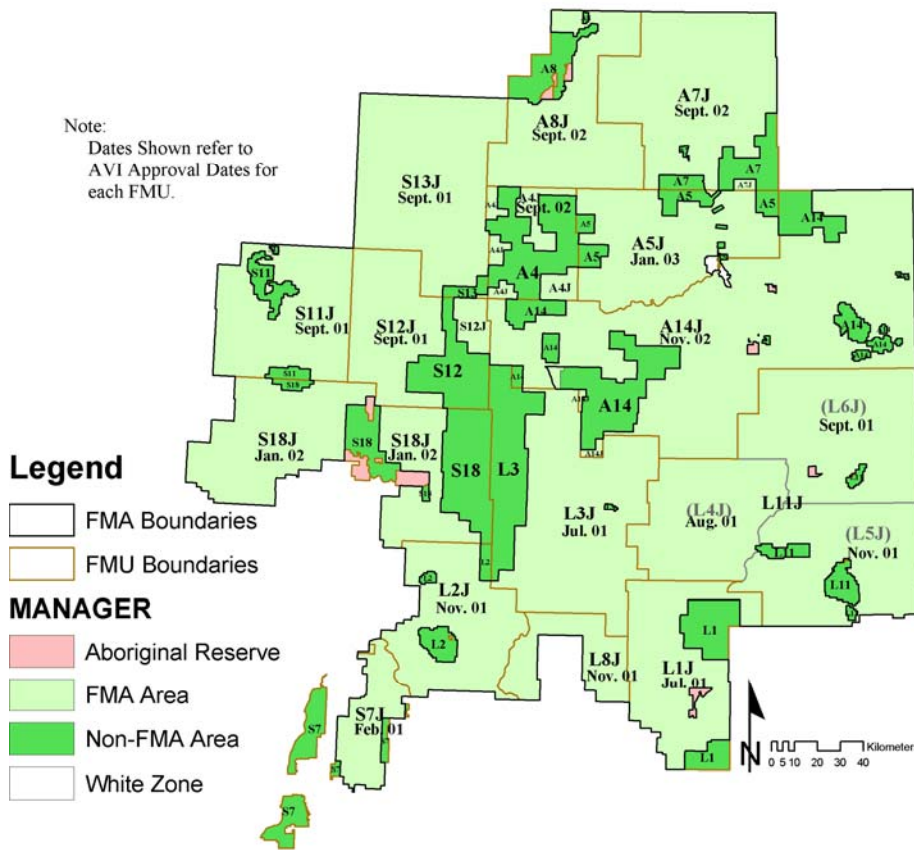


Figure 1-1. Overview of J and 'Non-J' areas along with status of AVI approval process.

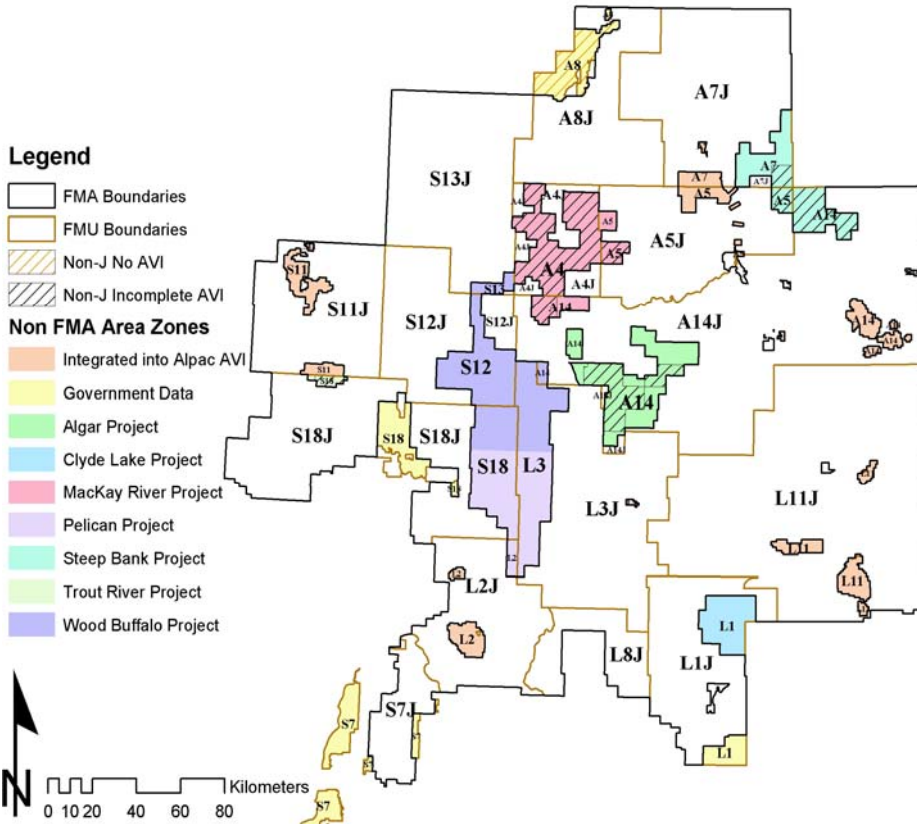


Figure 1-2. Overview of 'Non-J' inventory sources.

**Table 1-1. Summary of AVI status for FMUs within the FMA.**

Forest Management Unit (FMU)	A.V.I Audit / Approval				
	Original 1:15,000	Ortho Updates	CIR Updates	Update Photography	AVI Approval
1 S7J	Aug-93	1993	1999	May-00	Feb-01
2a S18J(S4J)	Aug-92	1992	2000	May-00	Jan-02
2b S18J(S8J)	Aug-92	1992	2001	May-00	Jan-02
3 S11J	Sep-95	1995	1997	May-97	Sept-01
4 S12J	Aug-95	1995	1997	---	Sept-01
5 S13J	Sep-96	1997	1997	---	Sept-01
6 L1J	Sep-93	1992	1996	May-00	July-01
7 L2J	Jul-93	1993	1999	May-00	Nov-01
8 L3J	Aug-94	1994	1995	May-01	July-01
9 L11J(L4J)	Aug-94	1995	1998	May-00	Aug-01
10 L11J(L5J)	Jun-96	1994	1998	May-00	Nov-01
11 L11J(L6J)	Sep-95	1995	1998	May-00	Sept-01

**Table 1-1. Summary of AVI status for FMUs within the FMA. (Continued)**

Forest Management Unit (FMU)		A.V.I Audit / Approval				AVI Approval
		Original 1:15,000	Ortho Updates	CIR Updates	Update Photography	
12	L8J	Aug-97	1994	1998	May-00	Nov-01
13a	A14J (A1)	Jul-99	1999	1998	Jun-99	Nov-02
13b	A14J(A2J)	Jul-99	1999	1998	May-00	Nov-02
13c	A14J(A3J)	Jul-99	1999	1998	May-00	Nov-02
13d	A14J (Clearwater) <sup>3</sup>	Sep-97	1991	1998	May-98	Sept-20
14	A4J	Sep-98	1999	1998	---	Sept-20
15	A5J	Aug-98	1999	1998	May-01	Jan-03
16	A7J	Sep-98	1994	1998	May-98	Sept-02
17	A8J	Sep-98	1994	1998	---	Sept-02

**Table 1-2. Summary of AVI status for 'Non-J' Area.**

Forest Management Unit (FMU)		A.V.I Audit / Approval			Completion Year
		Orig. Photos	AVI Status	Comments	
1a	S7 (Gov't. Data: Fringe)	1988	Complete	Completed by Gov't.	1990
1b	S7 (Gov't. Data: Vega)	1988,94	Complete	Completed by Gov't.	1989,94
2a	S18 (Gov't. Data)	N/A	N/A	No AVI process in place	N/A
2b	S18 (Wood Buffalo)	1997	Complete	Timberline Gov't. Contract	---
2c	S18 (Pelican Lake)	1997	Complete	Timberline Gov't. Contract	---
2d	S18 (Trout Lake)	1992	Incomplete	Timberline Gov't. Contract	---
3	S11 (Alpac AVI)	1992	Complete	Completed with Alpac AVI	---
4	S12 (Wood Buffalo)	1997	Complete	Timberline Gov't. Contract	---
5	S13 (Wood Buffalo)	1997	Complete	Timberline Gov't. Contract	---
6a	L1 (Clyde Lake)	1997	Complete	Timberline Gov't. Contract	Mar-02
6b	L1 (Gov't. Data)	---	Complete	Completed by Gov't.	---
7a	L2 (Alpac AVI)	1993	Complete	Completed with Alpac AVI	---
7b	L2 (Pelican Lake)	1993	Complete	Timberline Gov't. Contract	---
8a	L3 (Alpac AVI)	1997	Complete	Completed with Alpac AVI	---
8b	L3 (Pelican Lake)	1997	Complete	Timberline Gov't. Contract	---
8c	L3 (Wood Buffalo)	1997	Complete	Timberline Gov't. Contract	---
9	L4 (Alpac AVI)	1996	Complete	Completed with Alpac AVI	N/A
10	L5 (Alpac AVI)	1996	Complete	Completed with Alpac AVI	---
11	L6 (Alpac AVI)	1995	Complete	Completed with Alpac AVI	---
12	L8	N/A	N/A	No Non-FMA Area	N/A
13a	A14 (Alpac AVI)	1999	Incomplete	Completed with Alpac AVI	---
13b	A14 (Wood Buffalo)	1999	Incomplete	Timberline Gov't. Contract	---
13c	A14 (Steep Bank)	1999	Incomplete	Timberline Gov't. Contract	---
13d	A14 (Algar)	1999	Incomplete	Timberline Gov't. Contract	---
13e	A14 (MacKay River)	1999	Incomplete	Timberline Gov't. Contract	---
14	A4 (MacKay River)	1998	Incomplete	Timberline Gov't. Contract	---
15a	A5 (Alpac AVI)	1998	Incomplete	Timberline Gov't. Contract	---
15b	A5 (Steep Bank)	1998	Incomplete	Timberline Gov't. Contract	---
16a	A7 (Alpac AVI)	1999	Incomplete	Completed with Alpac AVI	---
16b	A7 (Steep Bank)	1999	Incomplete	Timberline Gov't. Contract	---
17	A8 (Gov't. Data)	N/A	N/A	No AVI process in place	N/A

<sup>3</sup> Clearwater Inventory includes 22 townships in A2 and A3.

## 1.2 Forest That Prohibits Timber Harvesting

This exclusion class was used to ensure that forested areas, designated as incompatible with timber planning were removed from the timber harvesting landbase. The following exclusion types were identified on the Alberta-Pacific FMA area:

- Private land;
- Protected Notations;
- Provincial Parks & Natural Areas;
- Aboriginal Reserves, Ecological Reserves, Liege River Area (Proposed); and
- Athabasca and Clearwater Breaks (Deciduous Only)

The current AVI does not carry any characteristics pertaining to land status. It was therefore necessary to integrate this additional information through the use of a geographical information system (GIS).

### 1.2.1 Private land

**Source:** LSAS (Land Status Automated System)

**Acquisition Date:** July 2000

**Effective Date:** July 2000

The current private land database held by Alberta Public Lands has very limited spatial capability with no digital boundaries. It is however capable of providing a gross approximation of the general location of private lands and their respective areas through the Land Status Automated System (LSAS). To enhance the utility of this database, a digital coverage was generated to the quarter section level, identifying the percentage of private land occurring within each quarter section (refer to Appendix III). To produce this digital coverage it was necessary to have a complete list of all quarter sections and their respective percentage of private land. Quarter sections were then extracted from the provincial index grid and assigned the appropriate percentage of private land<sup>4</sup>.

Private land reductions were then integrated into the netdown procedure by overlaying the resulting digital map with the AVI coverages. The general percentage reduction was then applied to the total area ensuring no bias towards any one strata type. The distribution of private land across the FMA area is presented in Figure 1-3.

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<sup>4</sup> Only quarter sections containing more than 0.1% private land were used in the analysis.



### 1.2.2 Protected Notations

**Source:** GLIMPS<sup>5</sup> (Sustainable Resource Development)

**Acquisition Date:** January 2000

**Effective Date:** Unknown

The protected notations (PNT) data set was extracted from the Land Status Automated System (LSAS) identifying PNTs at a quarter section resolution. Associated with each PNT record was the area of the current PNT and a list of overlapping quarter sections.

Appendix IV identifies the quarter section associated with each PNT and presents a map of the PNT locations across the FMA area. With no digital boundary, only coarse approximations of PNT locations could be attained. An exploratory analysis of the PNT database indicated that the majority of the PNTs do not prohibit timber harvesting but do have specific restrictions on harvesting operations. Because of the subjective nature of the PNT areas it was decided to leave all PNTs in the timber harvesting landbase and address any restrictions at the timber supply modelling level. Some PNT's were eliminated from the landbase. These PNT's were identified through discussions with SRD.

Permanent sample plots (PSPs) are one exception to this approach. Alberta-Pacific maintains a digital inventory of all PSP locations across the FMA area. All PSP locations were spatially identified and buffered 100m from all sides of the PSP boundary. The buffered PSPs were then integrated into the landbase determination process by overlaying the resultant digital map with the AVI. Area within the PSP buffers was excluded from the timber harvesting landbase.

### 1.2.3 Provincial Parks & Natural Areas

**Source:** Alberta Environmental Protection; Resource Data Division

**Acquisition Date:** December 2001

**Effective Date:** 2001 Parks

Provincial parks and natural areas were identified in the netdown procedure by overlaying the digital boundaries with the existing AVI. The park and natural area boundaries were acquired from Alberta Environment Resource Data Division (RDD) under the current data sharing agreement. They include all approved provincial parks and natural areas existing within the Province of Alberta and are presented at 1:20,000 scale. Figure 3 illustrates the distribution of provincial parks and natural areas located across the FMA area.

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<sup>5</sup> Geographic Land Information Management and Planning System.

#### 1.2.4 Aboriginal Reserves, Ecological Reserves

**Source:** Alberta Environmental Protection; Resource Data Division

**Acquisition Date:** February 2000

**Effective Date:** 1998 Base Data

Aboriginal reserves and ecological reserves within the FMA area were integrated into the landbase determination process by merging their digital boundaries with the AVI. These digital boundaries were received from Alberta Environment (Resource Data Division) under the current data sharing agreement. The digital boundaries for these areas were captured at a 1: 20,000 scale. The distribution of aboriginal reserves and ecological reserves existing across the FMA area is presented in Figure 1-3 below.

#### 1.2.5 Liege River Area (Proposed)

**Source:** Alberta Environmental Protection; Resource Data Division

**Acquisition Date:** April 2000

**Effective Date:** 2000

The Liege area was nominated as a candidate site under the Special Places 2000 program. This area was recommended by the Forest Management Task Force as an ecological benchmark to be used for monitoring of ecological processes. The proposed area will be re-evaluated in 2011. The area is to be treated as a separate compartment that will not be available for harvest scheduling until at least 2016.

The Liege area was incorporated into the netdown procedure by overlaying the current Liege boundary with the AVI digital data set. The Liege area was digitized at 1:1,000,000 scale by Alberta Environment (Resource Data Division) and was provided through the current data sharing agreement. The location of the Liege River Area is illustrated in Figure 1-3 below.

#### 1.2.6 Athabasca and Clearwater Breaks (Deciduous Only)

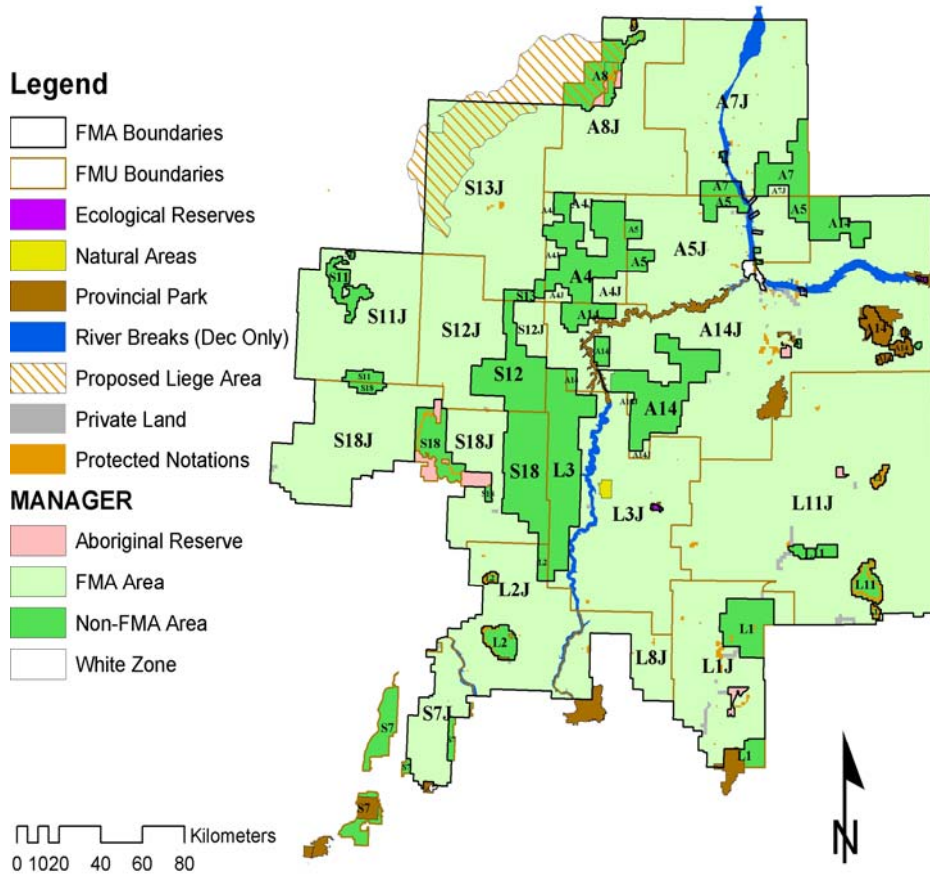
**Source:** Alberta-Pacific

**Acquisition Date:** April 2000

**Effective Date:** 1993; updated March 2000

Through the use of digital terrain models in combination with existing contour lines, Alberta-Pacific generated a digital representation of the river valley “breaks”. These areas are adjacent to rivers, and are marked by a significant change in slope which defines the river valleys. The resulting data set is used in conjunction with the existing watercourse buffers to ensure that the Athabasca and Clearwater River valleys are withheld from the deciduous harvesting landbase, in recognition of the tourism/ recreational potential of

these areas. Deciduous harvesting is ineligible for the entire planning horizon.. A detailed review of the options available will be undertaken and presented to the public by the local taskforce at or before 2009. Coniferous stands within these areas currently contribute to the coniferous harvesting landbase.



**Figure 1-3. Distribution of exclusions (uses that prohibit timber harvesting) on FMA area.**

### 1.3 Inoperable or Isolated Stands

Inoperable or isolated stands considered unsuitable for timber harvesting were identified and removed from the timber harvesting landbase. Forest types excluded from the timber harvesting landbase are summarized in the following four categories:

- Non-Forest Exclusions
- Subjective Deletions
- Sensitive Slopes
- Isolated Stands

#### 1.3.1 Non-Forest Exclusions

Non-forest exclusions were used to remove area from the gross landbase that is currently inventoried as non-forested. These exclusion types were defined using the following six classes:

- Natural Non-Vegetated
- Anthropogenic Non-Vegetated
- Anthropogenic Vegetated
- Non-Forest Vegetated
- Non-Forested Cutblocks
- Non-Forested Natural Disturbances

Definitions of these non-forested classes according to their AVI attributes are presented in Table 1-3.

**Table 1-3. Non-forest land classes defined using AVI.**

Non-Forest Land Class	Alberta Vegetation Inventory	
	Attribute	Value
Aquatic Features Naturally Non-Vegetated	NAT_NON	NWL, NWR, NWF
	NAT_NON	NWI, NWF, NMB, NMC, NMR, NMS
Anthropogenic Non-Vegetated	ANTH_NON	ASC, ASR, AIH, AIE, AIG, AIF, AIM, AII
	ANTH_VEG	CA, CP, CPR, CIP, CIW
Anthropogenic Vegetated Non-Forest Vegetated	NFL	BR, HF, HG, SC, SO
Non-Forested Cutblocks*	MOD1 & MOD2	CC: Pre-1991 blocks without a free to grow forest (i.e. AVI indicates no forest is currently established)
Non-Forested Natural Disturbances**	MOD1 & MOD2	BU, WF, CL, DI, IK, UK, WE, DT, BT, SN: without a free to grow forest (i.e. AVI indicates no forest is currently established)

\* - Harvested areas (mod1 = CC) may later be reassigned to the timber harvesting landbase.  
 \*\* - Burned areas that have been harvested and reforested will be reassigned to the timber harvesting landbase.

### 1.3.2 Subjective Deletions

Subjective deletions were identified across the FMA area to remove forested stands that are currently considered unsuitable for harvesting operations. This exclusion class was defined using the following categories:

- Non-commercial Coniferous Stand Densities
- Non-commercial Deciduous Stand Densities
- Non-commercial Species
- Non-commercial Site Index (Height – Age Relationship)
- Non-commercial Timber Productivity Rating (TPR)

#### 1.3.2.1 Non-commercial Coniferous Stand Densities

The non-commercial coniferous stand densities subjective deletions excluded older conifer stands with insufficient stocking. The AVI definition used to define the exclusion is presented in Table 1-4.

**Table 1-4. Inventory definition for non-commercial conifer stand density subjective deletion.**

Leading Species	Stand Density Class		Stand Origin (year)	Stand Height (meters)	MOD1
	Overstory	Understory			
P, Pl, Pj, Sb, Sw, Fb	A	A or NONE	< 1950	<18	◇ “CC”

#### 1.3.2.2 Non-commercial Deciduous Stand Densities

All ‘A’ density deciduous stands (6 – 30% Crown Closure) currently available for timber harvesting were excluded from the timber harvesting landbase, in their first rotation. In consideration of successional trends observed within the boreal forest it is assumed that ‘A’ density stands after natural break-up regenerate back to a stand containing a greater number of stems per ha (‘B’ density). In an attempt to mimic this natural process the ‘A’ density stands were initially excluded from the timber harvesting landbase and were returned to the productive landbase following natural break-up. The AVI definition used to define the exclusion is presented in Table 1-5.

**Table 1-5. Inventory definition for non-commercial deciduous stand density subjective deletion for the first rotation.**

Inventory	Leading Species	Stand Density Class	
		Overstory	Understory
AVI	Aw, Bw, Pb	A	A or NONE

**1.3.2.3 Non-commercial Species**

The non-commercial species subjective deletion removed all stands dominated by tree species that currently have no timber value. More specifically it removed all stands with larch assigned as the leading or secondary species. The AVI definition for this exclusion is presented in Table 1-6.

**Table 1-6. Inventory definition for non-commercial species subjective deletion.**

<b>Inventory</b>	<b>Sp 1</b>	<b>or</b>	<b>Sp 2</b>	<b>or</b>	<b>Sp 3</b>	<b>or</b>	<b>Sp 4</b>	<b>or</b>	<b>Sp 5</b>
AVI	Lt	or	Lt	or	Lt	or	Lt	or	Lt

**1.3.2.4 Non-commercial Site Index (Height – Age Relationship)**

The non-commercial site index subjective deletion excluded slow growing stands that may never reach merchantable height. The approach is based upon a height-age requirement that states a stand must attain a height of 15 meters by 180 years of age. The AVI rules are presented below (Table 1-7).

**Table 1-7. AVI Definition for non-commercial site index.**

<b>Stand Height (m)</b>	<b>Stand Age Threshold (years) by Leading Species</b>			
	<b>Sb or Lt</b>	<b>Pj or Pl</b>	<b>Sw or Fd or Fb</b>	<b>A or Aw or Bw or Pb</b>
1	>18	>13	>27	>18
2	>18	>13	>27	>18
3	>18	>13	>27	>18
4	>28	>22	>38	>26
5	>37	>28	>49	>34
6	>47	>37	>60	>46
7	>57	>47	>72	>53
8	>68	>57	>84	>67
9	>80	>68	>95	>75
10	>93	>80	>107	>86
11	>117	>95	>120	>101
12	>123	>111	>134	>117
13	>140	>130	>148	>136
14	>165	>160	>165	>160
15	>180	>180	>180	>180

**1.3.2.5 Non-commercial Timber Productivity Rating (TPR)**

This subjective deletion removed all stands with an unproductive (U) Timber Productivity Rating (TPR). The AVI definition for this exclusion is presented in Table 1-8.

**Table 1-8. Inventory definition for non-commercial timber productivity rating.**

<b>Inventory</b>	<b>Leading Species</b>	<b>TPR</b>	<b>MOD1</b>
AVI	Any	U	◇ “CC”

**1.3.3 Sensitive Slopes**

**Source:** Alberta Environmental Protection; Resource Data Division

**Acquisition Date:** May 2001

**Effective Date:** 1998 Base Data

This exclusion class was used to identify operationally sensitive slopes occurring within the FMA area. Sensitive slopes were defined according to the Operating Ground Rules<sup>6</sup>, which state that a 45% slope will normally serve as the upper limit for operability for ground based logging equipment. To ensure that these sensitive slopes were excluded from the timber harvesting landbase, only stands inventoried as having a slope percentage less than 45% remained as part of the timber harvesting landbase.

Due to the fact that the current AVI does not report slope as an inventory characteristic, it was necessary to develop slope coverage using GIS modelling procedures and the respective digital elevation points. The digital elevation points used within this analysis held a spatial resolution of 100m and were obtained from Alberta Environment (Resource Data Division) under the current data sharing agreement. Once identified, steep slopes were integrated into the AVI digital data set to identify areas with slopes greater than 45%.

<sup>6</sup> Alberta-Pacific Forest Industries. 2000. Alberta-Pacific’s Operating Ground Rules. Boyle, Alberta, Canada. p30.

### 1.3.4 Isolated Stands

Source: Access Layers - Spatial Data Warehouse Base Data from Alberta-Pacific

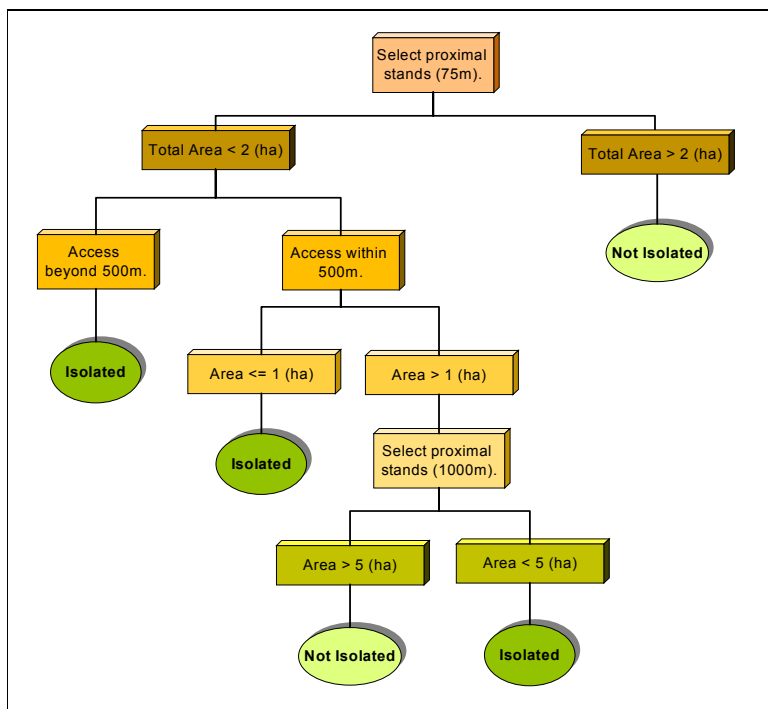
Acquisition Date: February 2000

Effective Date: 1998 Base Data

Isolated stands that are currently infeasible for harvesting due to spatial operating constraints were excluded from the available timber harvesting landbase. An isolated stand analysis was completed (in Arc/Info™) on the current digital forest cover, excluding all stands that are assumed to be isolated as defined in Table 1-9 and Figure 1-4. An example of this analysis for one township is shown in Appendix V of this report.

**Table 1-9. Criteria used to identify isolated stands in the AVI FMUs.**

Criterion	Description
1	All stands < 1 ha and not adjacent to other harvestable types
2	All stands $\geq 1$ ha and < 2 ha and not within 500m of a road or seismic line
3	All stands $\geq 1$ ha and < 2 ha that cannot be grouped to other harvestable stands within 1000m to make a minimum unit of 5 ha.





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## Figure 1-4. Isolated stands analysis implemented across the FMA area.

### 1.4 Operating Ground Rules

While current ground rules apply mostly to short-term planning, watercourse buffers were integrated into the Timber Supply Analysis (TSA) to become a part of the long term planning process. This was done to strengthen the link between short and long-term planning.

#### 1.4.1 Watercourse Buffers

**Source:** Spatial Data Warehouse Base Stream Data

**Acquisition Date:** May 2001

**Effective Date:** 1998 Base Data

FMA operating ground rules currently exclude harvesting activity in areas adjacent to and surrounding water features for watershed protection purposes.

##### 1.4.1.1 AVI Water Course Buffers

The watercourse buffer exclusion incorporates all rivers and lakes that currently exist in the AVI. It also incorporates stream data acquired from Alberta Base National Topographic Series (NTS) maps. Lake, stream and river buffer coverages were generated in accordance with buffer definitions as described by the current Operating Ground Rules.

Ground Rules are based on Alberta's watercourse classification system<sup>7</sup> which is different from the base stream data used by the Canadian Centre of Surveying and Mapping (CCSM) water classification systems. The relationship between CCSM, the AVI water classification and Alberta's watercourse classification is defined using the rules in Table 1-10.

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<sup>7</sup> Alberta-Pacific Forest Industries. 2000. Alberta-Pacific's Operating Ground Rules. Boyle, Alberta, Canada. pp29.

**Table 1-10. Summary of assumptions used to link CCSM and AVI codes to Alberta’s watercourse classification system.**

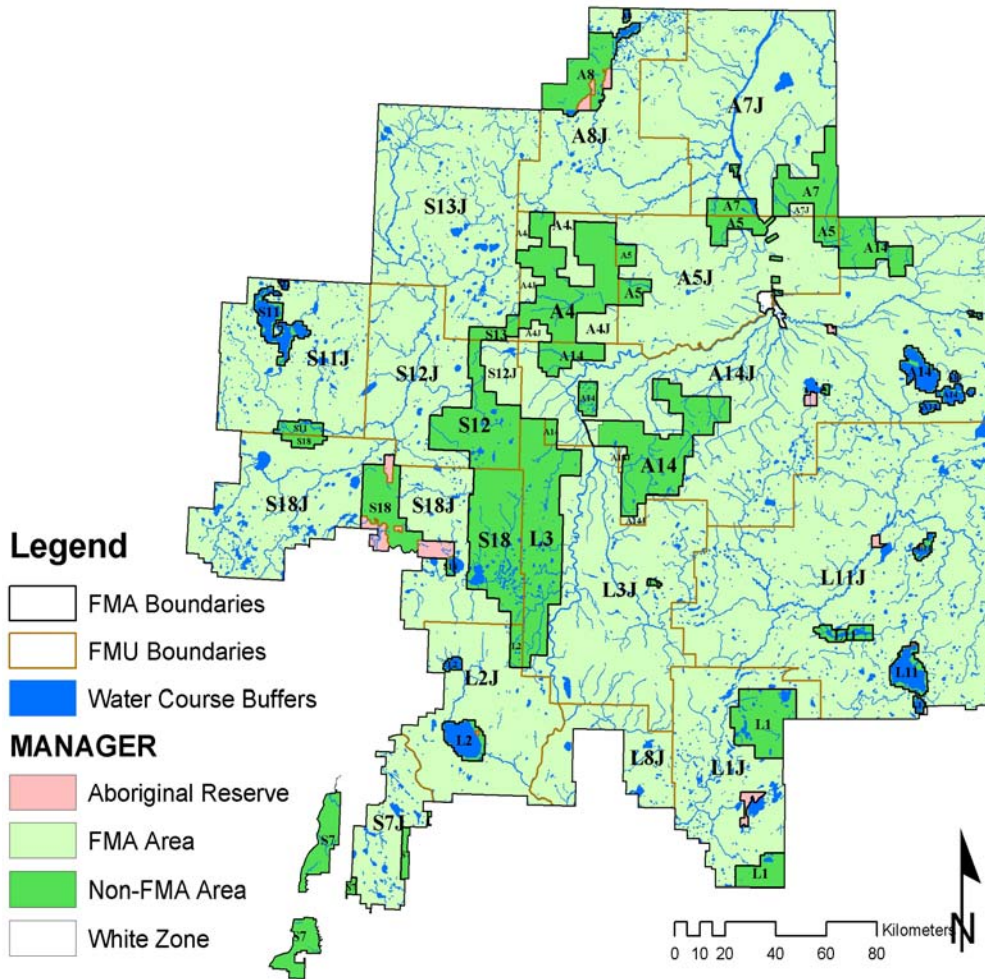
Alberta’s Watercourse Classification			CCSM Code / AVI Code		Final Buffer
Classification	Map Designation	Buffer	Classification	Description	
Large Permanent	solid heavy line or double line	60m	AVI: NWR	River	60m
Small Permanent	usually solid but some are broken lines	30m	CCSM: GA61900-0	Perennial constant line	30m
Intermittent	usually a broken light line	---	CCSM: GA61750-0	Intermittent constant line	---
Ephemeral	Not normally mapped	---	CCSM: GA-61700-0	Indefinite constant line	---
Lakes	solid line to outline a water body	100m (>4ha)	AVI: NWL All lakes greater than 4ha		100m (>4ha)
Water Source Areas	N/A	---	---	---	---

Large permanent streams were buffered 60m on each side of the stream, small permanent streams were buffered 30m on each side of the stream, and lakes greater than 4ha were buffered 100m from their high water mark. The resulting buffer coverages were merged together to produce a complete coverage encompassing the entire FMA area. The buffer coverage was then merged with the AVI coverage to identify stands or portions of stands that are within the specified buffer distance. This overlay allowed explicit quantification of forested areas contained within protective buffers. Figure 1-5 illustrates the results of the buffering process. Figure 1-6 illustrates the buffers applied in the FMA area.

Deleted: and Figure 1-6



**Figure 1-5. A representation of protective watercourse buffers applied within FMA area.**



**Figure 1-6. Protective watercourse buffers across FMA area.**

### 1.4.2 Integrated Resource Plan (IRP) Buffers

Additional buffering was required when buffering watercourse features within the Big Bend IRP areas, as follows:

- Banana Lake, Francis Lake and Meyer Lake required a buffer of 800 meters.
- Lawrence Lake and Chain Lakes required a buffer of 400 meters.

The areas inside the IRP buffers, but outside the watercourse buffers (Figure 1-7) are classified as “restricted harvesting”. This designation was defined in the IRP and states that there shall be no large-scale timber harvesting within these buffered areas; the volume recovered for any given stand only 50 percent of the inventoried volume. The FMP does not sequence into the IRP area in the first 3 periods.

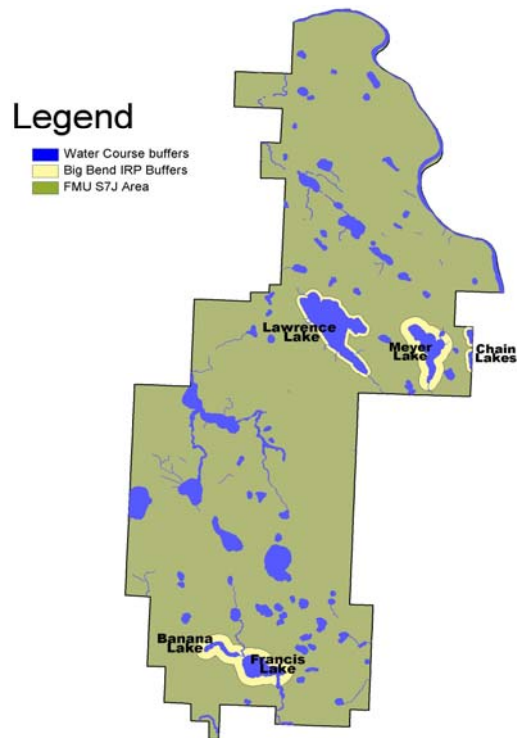


Figure 1-7. Distribution of IRP buffers identified in Big Bend IRP within FMU S7J.

## 1.5 Integration of Recent Landscape Disturbances

Integration of recent stand-level disturbance information into the netdown process served two purposes:

- It identified recent disturbances that are not currently part of the inventory; and
- It provided additional information on disturbances that were inventoried.

The following sections describe the methodology used to address and integrate stand-level disturbances into the landbase determination process. Fire, oil and gas, and harvesting activity are the three major disturbances occurring within the Alberta-Pacific FMA area.

### 1.5.1 Recent Fire Activity (Burns)

Recent fires not included in the current AVI were addressed in the following manner. All burns having no regenerating forest cover were excluded from the timber harvesting. One exception is that in areas where salvage cuts were undertaken, the current forest cover type may indicate no regenerating forest cover; due to reforestation commitments these areas remain a part of the productive landbase. The rationale for permanently excluding all other burned areas is based on the assumption that the amount of existing burn reflects the historic amount that can be expected to perpetuate through time.

The AVI data for some FMUs have not been updated since the inventory flight year. Therefore it is possible for the inventory to be as old as 10 years in some areas. Fire boundaries dating back to 1991 were required for a complete update. The Land and Forest Service (LFS) provided much of the digital fire database, with digital maps from 1998 to 2002. Fires occurring prior to 1998 and after the respective AVI flight year were captured by digitizing fire boundaries from provincial Phase3 (PH3) maps. Table 1-11 summarizes the fire update data sources. The next step in this approach was to merge the fire maps with the existing AVI inventory (Figure 1-8).

**Table 1-11. Summary of fire update data sources.**

<b>Year</b>	<b>Source of Fire Updates</b>
2002	Digital coverage received from LFS.
2001	Digital coverage received from LFS.
2000	Digital coverage received from LFS for Muskwa and Chisholm fires.
1999	Digital coverage received from LFS.
1998	Digital coverage received from LFS.
1997	Missing fires were digitized from PH3 inventory maps.
1996	Missing fires were digitized from PH3 inventory maps.
1995	Missing fires were digitized from PH3 inventory maps.
1994	Missing fires were digitized from PH3 inventory maps.
1993	Missing fires were digitized from PH3 inventory maps.
1992 and earlier	Fires were captured from the existing AVI inventory.

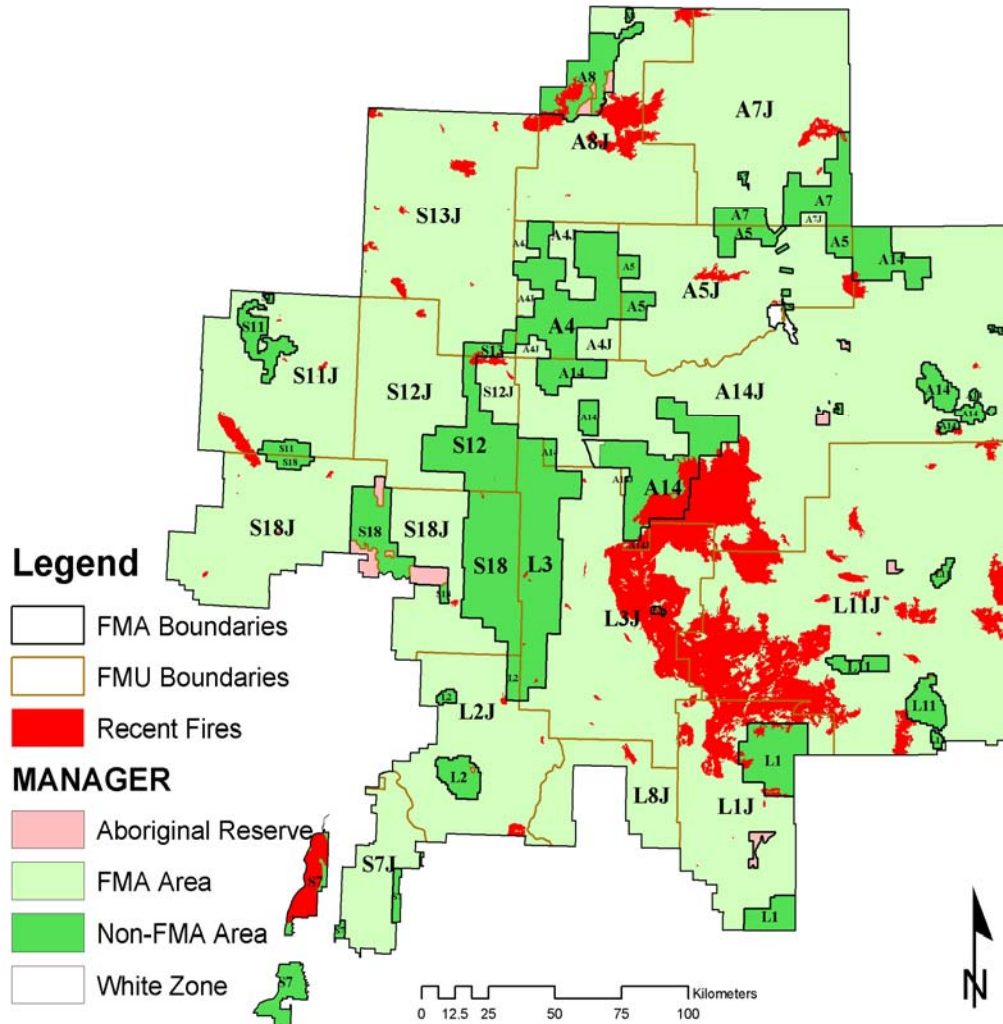


Figure 1-8. Distribution of recent fires across FMA area.

## 1.5.2 Oil & Gas Activity (Seismic / Well Site / Pipe Lines)

**Source:** Evergreen - Geophysical Final Plan Submissions

**Acquisition Date:** April 2000

**Effective Date:** 1999 Inclusive

This phase of the netdown identified areas recently disturbed through oil and gas activity. All disturbances occurring within the FMA area were excluded from the timber harvesting landbase. The rationale for excluding these areas is based on the assumption that the amount of existing activity reflects the amount that will continue to occur. The four main landscape disturbances resulting from oil and gas activity are well sites, seismic lines, roads and pipelines. The data source for recent activity came from Geophysical Final Plans submitted by companies engaged in oil and gas operations in the Alberta-Pacific FMA area (Figure 1-9 and Figure 1-10). Below is a general description of the process used to integrate oil and gas data into the netdown. A more detailed description of the integration process is provided in Appendix VI.

### 1.5.2.1 Well Sites

The AVI captured all well sites up to the year the inventory photos were flown. Recent well sites from the photo year forward were captured based on point locations for all wells which have been granted a licence. The data were retrieved from Alberta Energy records up to and including 1999.

The size of well sites in the AVI was not consistent. An exploratory analysis showed that the average area of all AVI well sites (ANTH\_NON = "CIW") was 0.9766 ha. Therefore, the well site point locations were buffered to create area features of 0.977 ha in size through GIS routines (Table 1-12).

### 1.5.2.2 Seismic Lines

The AVI does not capture seismic lines as polygon features because the width is less than the minimum opening used in mapping. Recent seismic data for the FMA area were collected from Geophysical Final Plans (to 1999) submitted by companies engaged in seismic operations. Seismic activity that predates the establishment of the FMA is assumed to be captured in the Alberta Government's "Access Layer" which has been used as a base for the subsequent capture of recent seismic activity.

Seismic lines vary in width. When line width was provided in the data, the recorded width is used to buffer the linear feature. For the most part, these lines represent recent seismic activity. Traditionally seismic lines have been 8m wide. In recent years the exploration industry has been slowly moving towards narrower lines. For this reason, lines cut after 1995 have been assigned a buffer width of 3m on each side (6m total) (Table 1-12). The remaining lines were assigned a buffer width of 4m on each side (8m

total) (Table 1-12). Most of these lines are contained in the original “Provincial Access Layer” and represent older seismic lines for the FMA area.

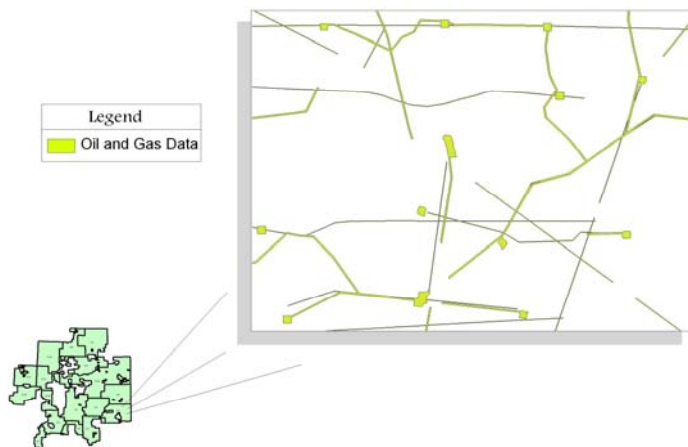
### 1.5.2.3 Pipe Lines

The AVI captured all pipelines up to the year the inventory photos were flown. The pipelines from the photo year forward were captured based on the record of Pipe Line Agreements (PLA) obtained through Alberta Energy (to 1999).

The PLA database provided the most accurate view of the existing pipeline network across the FMA area. The PLA database contained linear features that were buffered at 10m (20m total). This was deemed to be the average width of pipelines occurring within the Alberta-Pacific FMA area (Table 1-12).

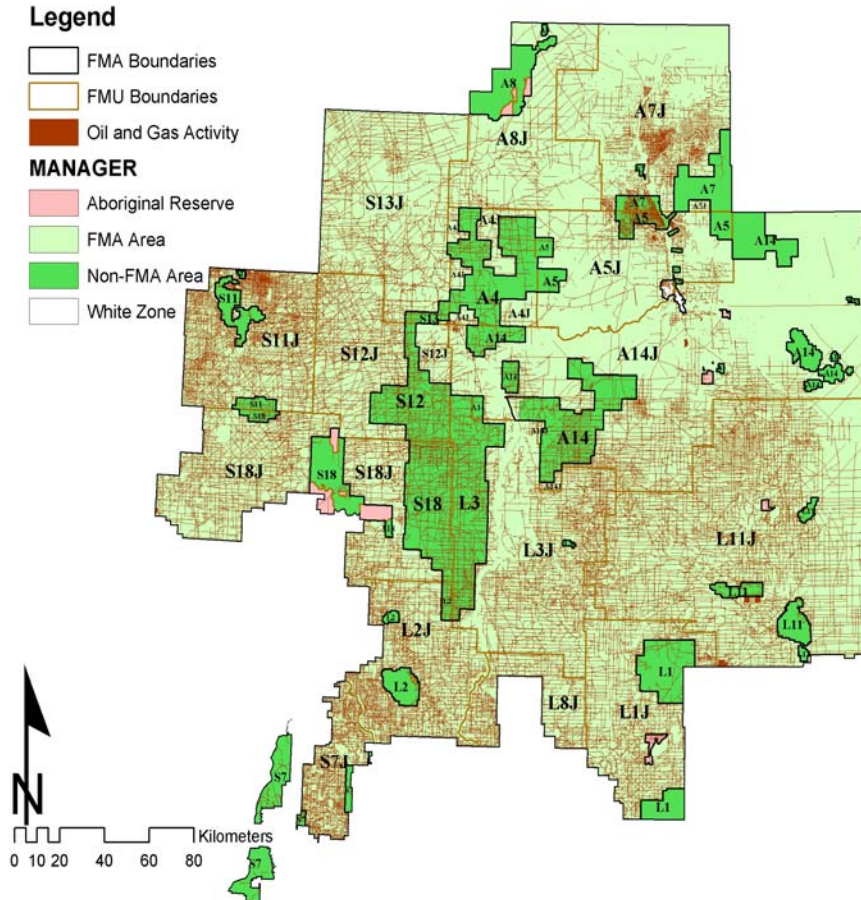
**Table 1-12. Buffer widths used to approximate polygon features from existing line and point features that represent current oil and gas activity.**

Feature	Type	Approximate Feature		Buffer Value (m)
		Width (m)	Area (ha)	
Seismic Line (Pre 1995)	Line	8	---	4
Seismic Line (Post 1995)	Line	6	---	3
Pipe Line	Line	20	---	10
Well Site	Point	---	0.977	55



**Figure 1-9. A representation of oil and gas disturbances excluded within the FMA area.**





**Figure 1-10. Overview of Oil and Gas exclusions across FMA area.**

### 1.5.3 Harvesting Activity (Cutblocks)

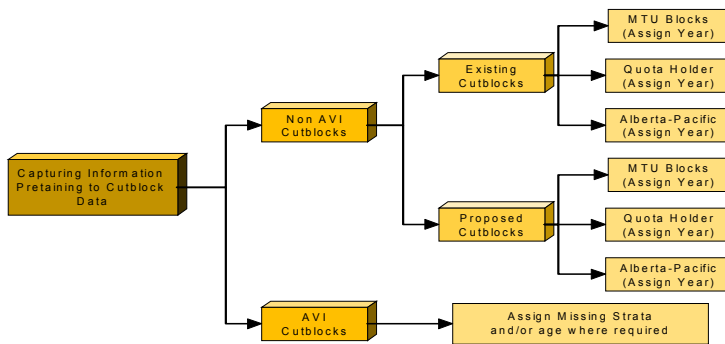
This phase of the landbase determination process was used to identify any recent harvesting activity not currently captured in the existing inventory, and to integrate additional information pertaining to inventoried blocks. The majority of existing cutblocks were assigned to the timber harvesting landbase with a valid regenerating yield class, landbase designation, age class and appropriate regeneration lag (Figure 1-13). The one exception is cutblocks harvested prior to 1991 with no current forest label. These older blocks were excluded from the timber harvesting landbase and assigned to the “Non-Forested Cutblock” stratum, as they have not satisfied the appropriate regeneration standards.

The Timber Supply Analysis (TSA) for the FMA area (‘J’ Units) will incorporate a spatial sequencing component. The integration of existing cutblocks is therefore essential to ensure that model sequencing is in accord with the existing operating plans. This step also provides an important link between long-term annual allowable cut (AAC) estimation and current short-term operational planning efforts. This approach requires geographic links between various sources of harvest block information and the existing AVI.

Data pertaining to existing cutblocks originated from Alberta-Pacific, the Quota Holders and the Lands and Forest Service (LFS). This link allows accurate landbase assignments, based on pre-harvest conditions and post-harvest treatments.

#### 1.5.3.1 Capturing Missing Information

Several sources of information were used in the development and subsequent update of the cutblock database. Figure 1-11 below illustrates the sources used to capture the missing cutblock information and provides some insight as to how the data sources were used.



**Figure 1-11. Information sources used in capturing cutblock information.**

Although much of the required information was captured through the update process, there were still several cutblocks that required additional information to ensure that proper strata and age classes were assigned. To capture this missing information, cutblock maps were generated and the missing block attributes were assigned by Alberta-Pacific and the various Quota Holders. Final cutblock maps were then generated for final review to ensure information quality. Figure 1-12 shows the distribution of existing harvest blocks across the FMA.

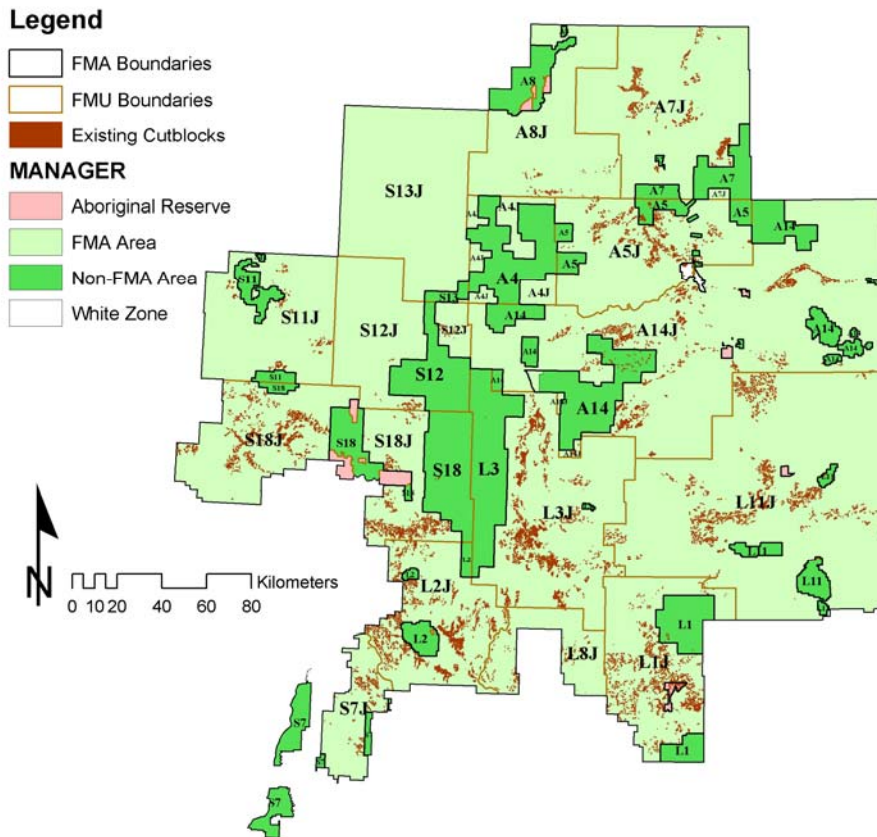


Figure 1-12. Distribution of existing harvest activity across AVI FMUs.

### 1.5.3.2 Cutblock Classification

Strata designations were assigned based solely on existing strata. Deciduous cuts were assigned no regeneration delay, whereas non-forested post-1991 conifer blocks were assigned a 5-year regeneration lag (Figure 1-13). Regenerating cover types were assigned in a systematic manner based upon the year in which they were harvested. Figure 1-13 below illustrates the process used to assign strata and age.

The AVI was the principal layer used to assign labels to regenerating cutblocks. Where available, additional stand regeneration information was used, specifically, Millar Western's Regenerated Stand Inventory (RSI) data for FMU L3 (see Appendix VII). Millar Western provided a RSI data layer that spatially identified the regeneration blocks along with the associated strata and age. This RSI data was added to the netdown process as a new layer and the associated information was used to override the AVI for cutblock assignment (Figure 1-13).

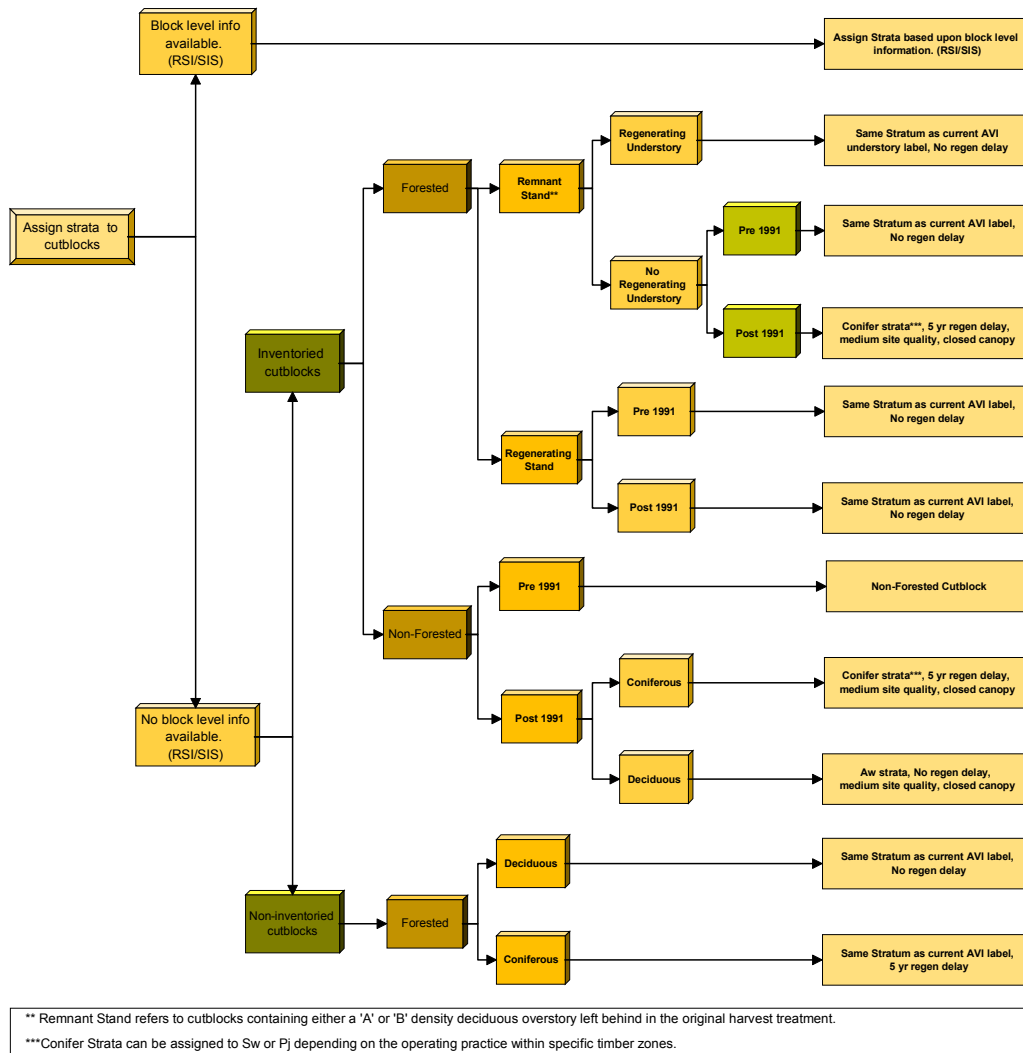


Figure 1-13. Cutblock strata and age assignment rules.

## 1.6 Integration of Landscape Planning Information

Integrating of additional landscape information was used to facilitate information requirements for comprehensive forest modeling. Additional information included:

- FMA / FMU / Operating Unit Boundaries;
- Natural Sub-Regions;
- Maintain Our Forest (MOF) Blocks;
- Grazing Leases/Permits;
- Planned Harvest Blocks/Areas (2001+);
- Summer Ground Classification;
- Caribou Zones;
- Alberta-Pacific Operational Planning Unit Boundaries; and
- Oil Sands – Proposed Future Development Areas.

The distribution of the integrated landscape planning information across the FMA area is presented in Figure 1-14, Figure 1-15 and Figure 1-16.

### 1.6.1 FMA / FMUs / Operating Units

**Source:** FMA/FMU – Alberta Environmental Protection; Lands and Forests Department  
: Operating Units – Alberta Pacific

**Acquisition Date:** FMA/FMU – May 2000  
: Operating Units – February 2000

**Effective Date:** FMA/FMU – May 2000  
: Operating Units – 1997

This information was required to measure, track, and control harvest levels, harvest scheduling and individual forest values within the planning environment.

### 1.6.2 Natural Sub-Region

**Source:** Alberta Environmental Protection

**Acquisition Date:** February 2000

**Effective Date:** Unknown

- Natural sub-region was incorporated to facilitate forest stratification within the planning environment. The layer also allowed tracking and controlling of forest values by ecological unit.

### 1.6.3 Maintain Our Forest (MOF) Blocks

**Source:** Alberta Environmental Protection

**Acquisition Date:** 1999

**Effective Date:** Unknown

In the 1980's a government program was put in place to conduct trials on establishing conifer on deciduous dominated sites. Although within the current inventory these blocks may be assigned a deciduous cover type, they are treated as part of the non-FMA conifer landbase. In accordance with paragraph 4(g) of the FMA, these blocks are outside the FMA area. A digital map of the blocks was geographically linked to the AVI. The locations of the MOF Blocks are presented in Figure 1-14.

### 1.6.4 Grazing Leases

**Source:** Evergreen Consulting – Calgary AB

**Acquisition Date:** March 2000

**Effective Date:** Unknown

Grazing leases surrounding the FMA were integrated into the netdown process through a sequence of digital overlays that incorporated the digital boundaries with the AVI. Although several land uses exist within these grazing areas, harvesting activity is permitted once all affected parties have been consulted. Within the current inventory, these areas are a part of the non-FMA conifer landbase and in accordance with the FMA, these areas are outside the FMA area. The locations of the grazing leases are presented in Figure 1-14.

### 1.6.5 Planned Harvest Blocks / Areas (2001+)

**Source:** Alberta-Pacific

**Acquisition Date:** January 2001

**Effective Date:** January 2001

Integration of the planned harvest block data will ensure that block sequencing is in agreement with current and existing operating plans. Data sources were acquired from both Alberta-Pacific and the various embedded Quota Holders within the FMA.





1.6.7 Caribou Zones and Ungulate Winter Zones

Source: Alberta-Pacific  
Acquisition Date: December 2001  
Effective Date: Unknown

Addition of the caribou zones and ungulate habitat will allow planners to evaluate and if necessary modify the level and type of harvesting within these areas.

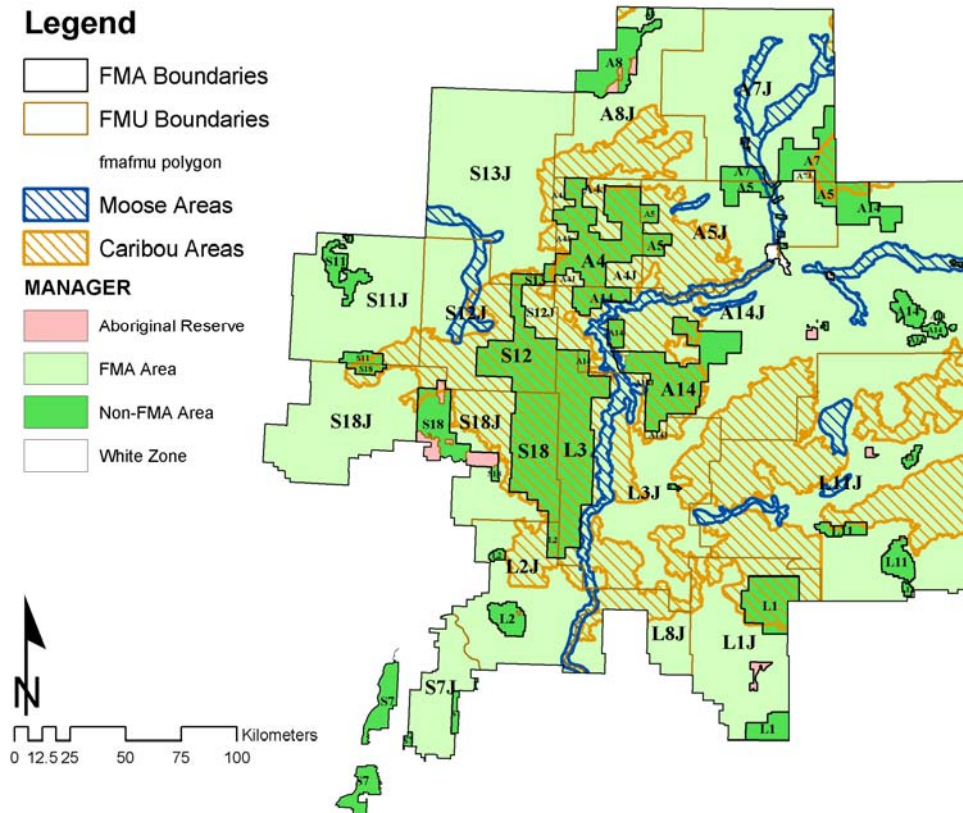


Figure 1-15. Distribution of caribou zones and ungulate winter zones information across the FMA area.

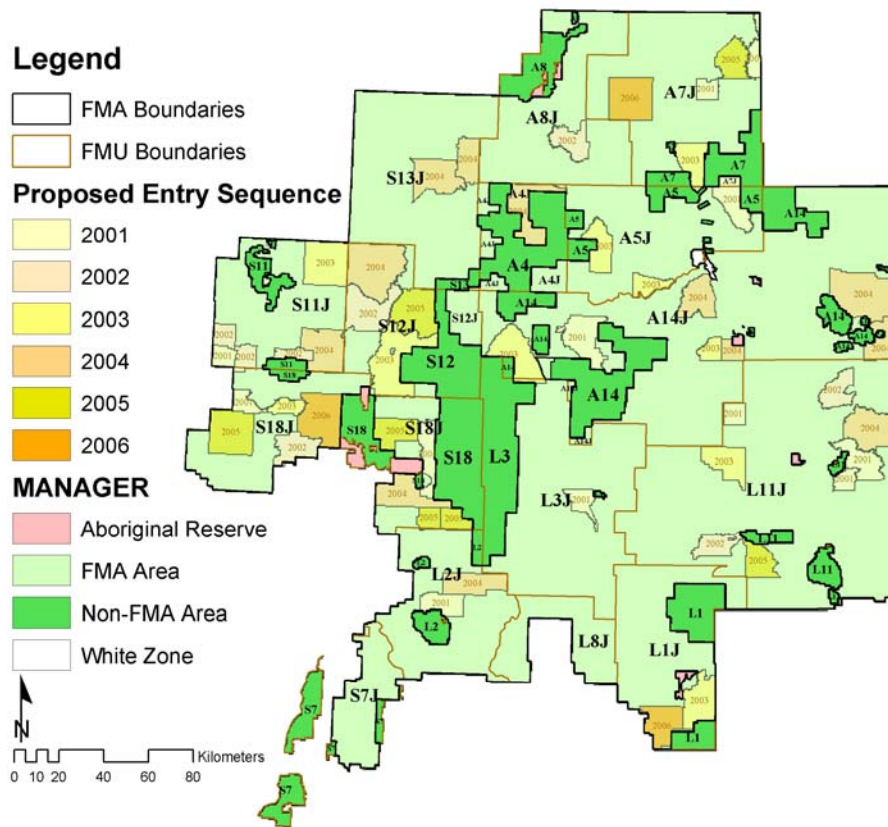
### 1.6.8 Alberta Pacific Planning Units

Source: Alberta-Pacific

Acquisition Date: January 2001

Effective Date: January 2001

This data layer was integrated to align proposed long-term planning with current operational planning efforts. The information may also facilitate an assessment of the potential long-term implications of current operational plans. Planning units are dynamic entities and may change to meet future management strategies. The distribution of the planning units across the FMA area is presented in Figure 1-16.



**Figure 1-16. Distribution of Alberta-Pacific's planning units across the FMA area.**

1.6.9 Oil Sands – Proposed Future Development Areas

Source: Alberta-Pacific & SRD  
 Acquisition Date: October 2002  
 Effective Date: October 2002

Two layers were added to the landbase to identify large-scale oil sands development projects proposed within the north-east portion of the FMA area. Along with the proposed development sites, a large area was defined that includes the potentially minable area within the north-east portion of the FMA area. The information will facilitate an assessment of potential long-term implications of proposed oil sands developments within the FMA area. The distribution of the proposed development areas across the FMA area is presented in Figure 1-17.

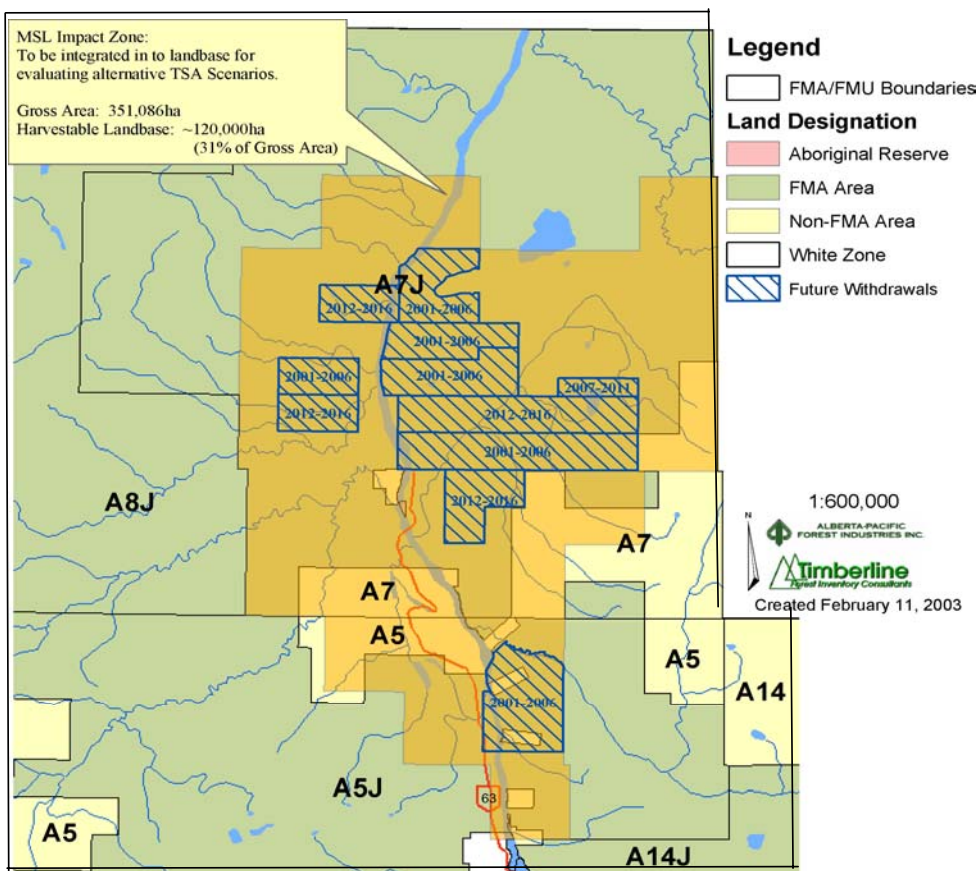


Figure 1-17. Distribution of proposed oil sands development areas across the FMA area.

## 1.7 GIS Processing and Sliver Polygon Removal

The GIS processing phase of the landbase determination process involved 24 overlays with various data layers (Table 1-13). All data layers were projected using the Universal Transverse Mercator projection, Zone 12 and a NAD27 datum. The overlays were performed using a fuzzy tolerance of 0.01 meters to ensure data consistency. The resultant landbase coverage showed that polygon numbers increased two or three times over the initial number of polygons in the AVI. To reduce the complexity and processing time required while keeping in mind the operational realism of the resultant landbase file, sliver polygons were eliminated. Exploratory analysis showed that more than half of the newly created polygons were slivers. Slivers were removed by first identifying all polygons that were less than 0.1 ha, and had a perimeter less than 600 meters. Polygons meeting these criteria could then be merged into adjacent polygons while keeping hard boundaries<sup>8</sup> (Table 1-13) intact. Removing the sliver polygons required using the ELIMINATE command within the ARC/INFO™ environment to eliminate arcs and force sliver polygons to merge into adjacent polygons. In the sliver elimination process the sliver polygon is assigned the attributes of the larger polygon with which it merges. Results of the sliver removal process are summarized in Appendix VIII. The results present polygon and cover group area distributions before and after the sliver removal process. The results show that the sliver removal process reduces complexity of the database without significantly affecting the integrity of the inventory.

**Table 1-13. Overview of data layers utilized in landbase determination process.**

Table Index	Data Layer	Boundary Type	Table Index	Data Layer	Boundary Type
1	AVI Forest Cover	Soft	13	Fire Update	Hard
2	Private Land	Hard	14	Oil/Gas Update	Hard
3	Protected Notations	Hard	15	Harvest Update	Soft
4	PSP Buffers	Hard	16	FMA/FMU/Operating Unit Boundaries	Hard
5	Provincial Park/Natural Area	Hard	17	Natural Sub-Region	Soft
6	Aboriginal Reserve	Hard	18	MOF Blocks	Hard
7	Ecological Reserve	Hard	19	Grazing Leases	Hard
8	Liege River Protected Area	Hard	20	Proposed Blocks and Planning Areas	Soft
9	River Breaks	Soft	21	Summer Ground	Soft
10	Steep Slopes	Hard	22	Caribou and Ungulate Winter Zones	Soft
11	Watercourse Buffers	Hard	23	Alberta-Pacific Planning Units	Soft
12	Big Bend IRP Lake Buffers	Hard	24	Oil Sands – Proposed Withdrawals	Soft

<sup>8</sup> Hard lines cannot be removed or dissolved in the sliver removal process; soft lines may be dissolved if required.

## 1.8 Development of the Netdown Database

The final netdown database was developed by stratifying the land base for timber supply modeling through database programming (Visual FoxPro™). The structure of the netdown database and the FMA area landbase determination process is contained in Appendix IX and Appendix X.

The following sections describe the general logic and assumptions associated with each step. The structure of the final netdown database is outlined in Appendix IX and Appendix X. The final FMA area netdown summary is presented in section 1.8.8 (Table 1-19) of this document.

### 1.8.1 Develop Yield Classes

Developing yield classes for the FMA area first required that each inventory polygon be classified in accordance with characteristics necessary to determine the yield class to which it belonged. Yield class assignment involved the establishment of two primary stand characteristics:

- Overstory and understory cover types; and
- Leading conifer species.

The following sections detail the process of assigning polygons to yield classes through cover type and leading conifer determination.

#### 1.8.1.1 Determine Overstory and Understory Cover Types

The AVI does not carry a cover group attribute; this attribute was developed as a function of the tree species and their associated crown closure percentage. Deciduous and coniferous percentage crown closure for both overstory and understory layers was tallied for each record in the AVI. The resulting characteristics were used to assign broad cover groups. The assignment rules are presented in Table 1-14. In agreement with Appendix C of the Forest Management Agreement, all 50-50 stands are assigned to the coniferous/deciduous (CD) cover group.

**Table 1-14. Summary of rules used to assign broad cover groups to AVI.**

Broad Cover Group	Crown Closure (10% Classes)	
	Deciduous	Conifer
C	0 - 20	80 - 100
CD	30 - 50	50 - 70
DC	60 - 70	30 - 40
D	80 - 100	0 - 20

**1.8.1.2 Determine Leading Conifer Species**

The stratification process identified the leading conifer species for yield class assignment. The method employed was to select the first leading conifer species from the AVI attribute list for each polygon.

**1.8.1.3 Assign Yield Classes**

Yield classes were assigned according to the rules summarized in Table 1-15.

**Table 1-15. Rules used to define yield classes.**

Table Index	Broad Cover Group	Yield Class	Inventory Defining Characteristics (AVI)					FMA Area Zones
			Cover Group		Leading Conifer <sup>9</sup>	Stand Density	TPR	
			Over	Under				
1	Deciduous Types							
1.a	1-3 – Aw-Composite		D	---	None	ABCD	U,F,M,G	All
1.b	4 – Aw-S-O		D	---	Sw/Sb/Fb	AB	U,F,M,G	All
1.c	5 – Aw-S-C-S		D	---	Sw/Sb/Fb	CD	U,F,M,G	South
1.d	6 – Aw-S-C-N		D	---	Sw/Sb/Fb	CD	U,F,M,G	North
1.e	7 – Aw-Pj		D	---	Pj	ABCD	U,F,M,G	All
2	Mixedwood Types – Deciduous Coniferous Types & Coniferous Deciduous Types							
2.a	8 – AwS-S		DC	---	Sw/Sb/Fb	ABCD	U,F,M,G	South
2.b	9 – AwS-N		DC	---	Sw/Sb/Fb	ABCD	U,F,M,G	North
2.c	10 – PjAw/AwPj		DC/CD	---	Pj	ABCD	U,F,M,G	All
2.d	11 – SAw-S		CD	---	Sw/Sb/Fb	ABCD	U,F,M,G	South
2.e	12 – SAw-N		CD	---	Sw/Sb/Fb	ABCD	U,F,M,G	North
3	Coniferous Types							
3.a	13 – Sw-O		C	---	Sw/Fb	AB	U,F,M,G	All
3.b	14 – Sw-C-FM		C	---	Sw/Fb	CD	U,F,M	All
3.c	15 – Sw-C-G		C	---	Sw/Fb	CD	G	All
3.d	16 – Sb-O		C	---	Sb	AB	U,F,M,G	All
3.e	17 – Sb-C-FM		C	---	Sb	CD	U,F,M	All
3.f	18 – Sb-C-G		C	---	Sb	CD	G	All
3.g	19 – Pj-O-C-FM		C	---	Pj	ABCD	U,F,M,G	All
3.h	21 – Pj-C-G		C	---	Pj	CD	G	All
4	Deciduous with Understory							
4.a	22 – Aw-U-FM		D	C/CD/DC	None/Pj	ABCD	U,F,M	All
4.b	23 – Aw-U-G		D	C/CD/DC	None/Pj	ABCD	G	All
4.c	24 – Aw-S-U-S		D	C/CD/DC	Sw/Sb/Fb	ABCD	U,F,M,G	South
4.c	25 – Aw-S-U-N		D	C/CD/DC	Sw/Sb/Fb	ABCD	U,F,M,G	North
5	Non-Commercial Coniferous Types							
5.a	26 – Lt				Lt	ABCD	U,F,M,G	All
6	Non-Forested Yield Classes							
6.a	200 – NFCC	Non-Forested Cutblocks			See definitions in:			
6.b	201 – NFALL	Non-Forested Natural Disturbances			Table 1-3. Non-forest land classes			
6.c	300 – NFV	Non-Forested Vegetated			defined using AVI			
6.d	400 – AV	Anthropogenic Vegetated						
6.e	500 – ANV	Anthropogenic Non-Vegetated						
6.f	600 – NNV	Naturally Non-Vegetated						

**Legend**

-O = Open Crown Closure -A&B Density                      -F = Fair Site  
 -C = Closed Crown Closure -C&D Density                    -M = Medium Site  
 -U = Deciduous with Conifer Understory                    -G = Good Site  
 -South = FMUs S7, S18, L1, L2, L3, L4, L5, L6, L8  
 -North = FMUs S11, S12, S13, A14, A4, A5, A7, A8

<sup>9</sup> Leading Conifer (as described in section 1.8.1.2) does not mean that the stand is conifer dominated; it is used to identify the leading conifer component within the stand.

### 1.8.2 Apply Exclusion Rules

Previous sections described how the exclusions were defined utilizing various sources of data. Developing the netdown database required pulling the exclusions into a thematic classification to facilitate forest modeling. The method used to structure the exclusions for timber harvest planning was sequenced as follows:

- Create a theme to track areas that prohibit timber harvesting;
- Create a theme to track inoperable or isolated areas / recently disturbed areas; and
- Create a theme to track operating ground rules (watercourse and IRP buffers).

Exclusions were not mutually exclusive and overlaps occurred. Exclusions were ordered in a hierarchical list to facilitate assignments and netdown summaries. The hierarchy was built with no specific preferences toward any one exclusion type. The sole intent was to ensure that the process is systematic, explicit and reproducible. Table 1-16 outlines the hierarchy used for applying terrestrial landbase exclusions only.

**Table 1-16. Summary of exclusion hierarchy used in terrestrial landbase netdown only.**

Table Index	Exclusion	Theme	Code	Hierarchy
1	Provincial Parks and Natural Areas	Prohibits Timber Harvesting	PARK	1
2	Aboriginal Reserve	Prohibits Timber Harvesting	AB-RES	2
3	Ecological Reserve	Prohibits Timber Harvesting	ER-RES	3
4	Protected Notations	Prohibits Timber Harvesting	PNT-N	4
5	PSP Buffers	Prohibits Timber Harvesting	PSP-BUF	5
6	Recently Burnt Area <sup>10</sup>	Recently Disturbed Stand Area	FIRE <sup>10</sup>	6
7	Recent Oil & Gas Activity	Recently Disturbed Stand Area	OIL	7
8	Watercourse Buffers	Operating Ground Rules	BUF	8
9	Steep Slopes	Inoperable / Isolated Stands	SLOPE	9
10	Isolated Stands	Inoperable / Isolated Stands	ISO	10
11	Non-Forested Cutblocks	Inoperable / Isolated Stands	NFCC	11
12	Non-Forested Natural Disturbances	Inoperable / Isolated Stands	NFALL	12
13	Non-Forest Vegetated	Inoperable / Isolated Stands	NFV	13
14	Anthropogenic Vegetated	Inoperable / Isolated Stands	AV	14
15	Anthropogenic Non-Vegetated	Inoperable / Isolated Stands	ANV	15
16	Naturally Non-Vegetated	Inoperable / Isolated Stands	NNV	16
17	Non-Commercial TPR	Inoperable / Isolated Stands	USITE	17
18	Non-Commercial Species	Inoperable / Isolated Stands	LARCH	18
19	Non-Commercial Site Index	Inoperable / Isolated Stands	UINDEX	19
20	Non-Commercial Density	Inoperable / Isolated Stands	UDENS	20
21	River Breaks (Deciduous Only)	Prohibits Timber Harvesting	DRIV-BRK	21
22	Oil Sands Development Projects <sup>11</sup>	Prohibits Timber Harvesting	OIL-AP	22

<sup>10</sup>Burnt areas that have been harvested and reforested under the current reforestation guidelines are not currently removed from the timber harvesting landbase.

<sup>11</sup> The oil sands development areas will be sequenced out of the landbase according to their proposed development dates.



### 1.8.3 Horizontal Stand Adjustment

Horizontal stands occur when two or more strata exist within the same polygon and are dispersed in such a way that it is difficult, if not impossible, to individually classify each stratum. There are several different ways in which these horizontal stands can be dealt with in the netdown process. The approach applied here was to base yield class assignment on the dominant forest layer.

Three scenarios occur within AVI horizontal stands:

- 1) Harvestable overstory- Harvestable understory;
- 2) Unharvestable overstory- Unharvestable understory; and
- 3) Harvestable overstory- Unharvestable understory.

The first scenario is addressed through assigning the entire polygon area to the layer occupying the larger percentage of the polygon. The second case scenario is of little concern here since these stands have already been addressed in the non-forest exclusions section. This leaves only the third scenario where yield class is based on harvestable overstory and polygon area was adjusted using an area-based reduction, proportional to the stand percentage classified as non-forested.

### 1.8.4 Landbase Assignments

Landbase is determined as a function of inventory cover type and administrative boundary. The 2001 TSA will be modelled using a single landbase; however the landbase assignments were intentionally left as part of the landbase determination process to facilitate landbase queries that may arise. Table 1-17 below summarizes the landbase assignment rules used in the netdown.

**Table 1-17. Rules used to designate landbase.**

<b>Landbase</b>	<b>Broad Cover Group</b>	<b>FMU</b>
Coniferous	- C, CD - DC	ALL L2, L3, S18, S11, S7, L8, A2, A3, A4, A5, A7, A8
Deciduous	- D, DU - DC	ALL A1, L1, L4, L5, L6, S12, S13

### 1.8.5 Stand Age Assignments

Stand ages were derived using the stand origin field from the AVI. A field was added to the netdown database to track current stand age. Timber supply modeling begins in 2001, therefore current age is 2001 minus origin year.

Existing harvest blocks having no age information were assigned an age based on the rules summarised in Section 1.5.3.

Age class assignments, once identified, are placed into five year intervals for modeling purposes. To ensure that the modeling year is consistent with the timber supply start year, age classes are assigned assuming year 2001 is age 0 (Table 1-18).

**Table 1-18. Age class assignments by origin and modeling year.**

<b>Origin Year</b>	<b>Modeling Period Age</b>	<b>Origin Year</b>	<b>Modeling Period Age</b>
1996-2000	1	1921-1925	16
1991-1995	2	1916-1920	17
1986-1990	3	1911-1915	18
1981-1985	4	1906-1910	19
1976-1980	5	1901-1905	20
1971-1975	6	1896-1900	21
1966-1970	7	1891-1895	22
1961-1965	8	1886-1890	23
1956-1960	9	1881-1885	24
1951-1955	10	1876-1880	25
1946-1950	11	1871-1875	26
1941-1945	12	1866-1870	27
1936-1940	13	1861-1865	28
1931-1935	14	1856-1860	29
1926-1930	15	1851-1855	30

### 1.8.6 Net Area Determination

Net stand area was equal to gross stand area less the area of stands flagged as private land and horizontal stands with a non-forested component. A field was added to the netdown database to track net area.

### 1.8.7 Adjust Cutblock Classification

Cutblocks required specific classification rules to prepare them for timber supply modelling. Yield class, age, and regeneration lag were required for each harvest block and depending on the source, different rules and assumptions were applied to harvested block classification. Section 1.5.3 summarises the assumptions and rules used for cutblock classification.

### 1.8.8 Generate Final Netdown Summary

Once all exclusions were identified and stratification was complete a netdown summary was prepared. Exclusions were not mutually exclusive and overlap existed. The exclusions were put in a hierarchical list to facilitate the netdown summaries. As mentioned previously, the hierarchy was built with no specific preferences toward any one exclusion type. The intent was to make the process systematic and reproducible. Table 1-16 outlines the hierarchy used for applying exclusions.

The results for areas inside and outside the Alberta-Pacific FMA boundary are presented in Table 1-19<sup>12</sup>. Maps showing distribution of exclusions and harvestable cover types on the FMA area are presented in Appendix II. The AVI maps were generated using digital forest cover. It is important to remember that maps show only stand-level exclusions. The structure of the resultant netdown AVI database is presented in Appendix IX and Phase 3 database is presented in Appendix X.

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<sup>12</sup> Area summaries were queried on the netdown database by summarising area [nha] while grouping by the [FMU] and [net\_label] fields.

**Table 1-19. Netdown summary for Alberta-Pacific FMA area.**

Table Index	Netdown Category	Forest Management Agreement Area			Landbase (%)
		Non-Forested Area(ha)	Forested Area(ha)	Total Area(ha)	
<b>1</b>	<b>Prohibits/Precludes Timber Harvesting</b>				
1.a	Provincial Park	6,498.6	47,272.5	53,771.1	0.9%
1.b	Aboriginal Reserve	58.7	95.6	154.3	0.0%
1.c	Ecological Reserve	0.0	0.0	0.0	0.0%
1.d	Protective Notations	924.9	5,866.5	6,791.4	0.1%
1.e	PSP Buffers	56.9	697.5	754.4	0.0%
1.f	River Breaks	0.0	36,996.7	36,996.7	0.6%
1.g	Private Land	1,491.6	3,013.4	4,505.0	0.1%
	<b>Sub-total</b>	<b>9,030.8</b>	<b>93,942.3</b>	<b>102,973.0</b>	<b>1.8%</b>
<b>2</b>	<b>Recently Disturbed Areas</b>				
2.a	Fire	434,529.8	0.0	434,529.8	7.5%
2.b	Oil and Gas	70,294.6	0.0	70,294.6	1.2%
	<b>Sub-total</b>	<b>504,824.4</b>	<b>0.0</b>	<b>504,824.4</b>	<b>8.7%</b>
<b>3</b>	<b>Inoperable / Isolated Stands</b>				
3.a	Slope	1.3	14.8	16.1	0.0%
3.b	Isolated Harvestable stands	0.0	3,215.2	3,215.2	0.1%
3.c	Non-Forested (CC)	5,323.8	0.0	5,323.8	0.1%
3.d	Non-Forested Natural Disturbance	226,705.1	0.0	226,705.1	3.9%
3.e	Non-Forested Vegetated	212,385.9	0.0	212,385.9	3.7%
3.f	Anthropogenic Vegetated	9,517.6	0.0	9,517.6	0.2%
3.g	Anthropogenic Non-Vegetated	18,362.7	0.0	18,362.7	0.3%
3.h	Naturally Non-Vegetated	909.4	0.0	909.4	0.0%
3.i	Non-Commercial TPR	0.0	444,954.3	444,954.3	7.7%
3.j	Non-Commercial Species	0.0	586,857.0	586,857.0	10.2%
3.k	Non-Commercial Stand Density	0.0	86,603.8	86,603.8	1.5%
3.l	Non-Commercial Site Index	0.0	1,077,956.3	1,077,956.3	18.6%
3.m	Horizontal Stand Adjustment	3,628.1	0.0	3,628.1	0.1%
	<b>Sub-total</b>	<b>476,834.0</b>	<b>2,199,601.5</b>	<b>2,676,435.4</b>	<b>46.3%</b>
<b>4</b>	<b>Water Course Buffers</b>				
4.a	Buffer	61,699.2	69,585.1	131,284.3	2.3%
	<b>Sub-total</b>	<b>61,699.2</b>	<b>69,585.1</b>	<b>131,284.3</b>	<b>2.3%</b>
<b>5</b>	<b>Aquatic Features</b>				
5.a	Rivers	24,886.9	0.0	24,886.9	0.4%
5.b	Lakes	122,286.7	0.0	122,286.7	2.1%
5.c	Flooded Areas	24,731.1	0.0	24,731.1	0.4%
	<b>Sub-total</b>	<b>171,904.7</b>	<b>0.0</b>	<b>171,904.7</b>	<b>3.0%</b>
<b>6</b>	<b>Oil Sands - Future Project Deletions: Impact on Timber Harvesting Landbase</b>				
6.a	Deciduous	0.0	9,120.4	9,120.4	0.2%
6.b	Deciduous / Coniferous	0.0	1,885.9	1,885.9	0.0%
6.c	Coniferous / Deciduous	0.0	1,831.8	1,831.8	0.0%
6.d	Coniferous	0.0	11,870.3	11,870.3	0.2%
6.e	Deciduous w/ Conifer Understory	0.0	6,970.5	6,970.5	0.1%
	<b>Sub-total</b>	<b>0.0</b>	<b>31,678.8</b>	<b>31,678.8</b>	<b>0.5%</b>
<b>7</b>	<b>Timber Harvesting Landbase</b>				
7.a	Deciduous	0.0	699,282.0	699,282.0	12.1%
7.b	Deciduous / Coniferous	0.0	117,642.1	117,642.1	2.0%
7.c	Coniferous / Deciduous	0.0	118,683.5	118,683.5	2.1%
7.d	Coniferous	0.0	808,542.0	808,542.0	14.0%
7.e	Deciduous w/ Conifer Understory	0.0	416,964.3	416,964.3	7.2%
	<b>Sub-total</b>	<b>0.0</b>	<b>2,161,113.8</b>	<b>2,161,113.8</b>	<b>37.4%</b>
<b>Grand Total</b>		<b>1,224,293.0</b>	<b>4,555,921.6</b>	<b>5,780,214.6</b>	<b>100.0%</b>

**Table 1-20. Netdown summary for 'Non-J' area outside FMA area.**

<b>Ind -ex</b>	<b>Netdown Category</b>	<b>Non-Forested Area (ha)</b>	<b>Forested Area (ha)</b>	<b>Total Area (ha)</b>	<b>Landbase (%)</b>
<b>1</b>	<b>Prohibits/Precludes Timber Harvesting</b>				
1.a	Provincial Park	18,675.7	16,144.5	34,820.2	3.2%
1.b	Aboriginal Reserve	1,991.9	11,875.1	13,867.0	1.3%
1.c	Ecological Reserve	73.7	815.4	889.1	0.1%
1.d	Protective Notations	232.2	1,258.2	1,490.4	0.1%
1.e	PSP Buffers	2.0	38.0	40.0	0.0%
1.f	River Breaks	0.0	31.3	31.3	0.0%
1.g	Private Land	808.4	2,316.2	3,124.6	0.3%
	<b>Sub-total</b>	<b>21,783.9</b>	<b>32,478.6</b>	<b>54,262.6</b>	<b>5.0%</b>
<b>2</b>	<b>Recently Disturbed Areas</b>				
2.a	Fire	8,045.4	0.0	8,045.4	0.7%
2.b	Oil and Gas	33,356.3	0.0	33,356.3	3.1%
	<b>Sub-total</b>	<b>41,401.7</b>	<b>0.0</b>	<b>41,401.7</b>	<b>3.8%</b>
<b>3</b>	<b>Inoperable / Isolated Stands</b>				
3.a	Slope	0.0	148.2	148.2	0.0%
3.b	Isolated Harvestable stands	0.0	595.8	595.8	0.1%
3.c	Non-Forested (CC)	1,458.2	0.0	1,458.2	0.1%
3.d	Non-Forested Natural Disturbance	32,671.1	0.0	32,671.1	3.0%
3.e	Non-Forested Vegetated	339,979.4	0.0	339,979.4	31.3%
3.f	Anthropogenic Vegetated	1,474.8	0.0	1,474.8	0.1%
3.g	Anthropogenic Non-Vegetated	3,255.6	0.0	3,255.6	0.3%
3.h	Naturally Non-Vegetated	13.3	0.0	13.3	0.0%
3.i	Non-Commercial TPR	0.0	79,118.3	79,118.3	7.3%
3.j	Non-Commercial Species	0.0	92,585.8	92,585.8	8.5%
3.k	Non-Commercial Stand Density	0.0	5,525.1	5,525.1	0.5%
3.l	Non-Commercial Site Index	0.0	184,118.5	184,118.5	17.0%
3.m	Horizontal Stand Adjustment	634.8	0.0	634.8	0.1%
	<b>Sub-total</b>	<b>379,487.3</b>	<b>362,091.7</b>	<b>741,579.0</b>	<b>68.3%</b>
<b>4</b>	<b>Water Course Buffers</b>				
4.a	Buffer	8,117.5	12,123.2	20,240.7	1.9%
	<b>Sub-total</b>	<b>8,117.5</b>	<b>12,123.2</b>	<b>20,240.7</b>	<b>1.9%</b>
<b>5</b>	<b>Aquatic Features</b>				
5.a	Rivers	103.7	0.0	103.7	0.0%
5.b	Lakes	116,719.4	0.0	116,719.4	10.7%
5.c	Flooded Areas	447.3	0.0	447.3	0.0%
	<b>Sub-total</b>	<b>117,270.4</b>	<b>0.0</b>	<b>117,270.4</b>	<b>10.8%</b>
<b>6</b>	<b>Oil Sands - Future Project Deletions: Impact on Timber Harvesting Landbase</b>				
6.a	Deciduous	0.0	0.0	0.0	0.0%
6.b	Deciduous / Coniferous	0.0	0.0	0.0	0.0%
6.c	Coniferous / Deciduous	0.0	0.0	0.0	0.0%
6.d	Coniferous	0.0	0.0	0.0	0.0%
6.e	Deciduous w/ Conifer Understorey	0.0	0.0	0.0	0.0%
	<b>Sub-total</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0%</b>
<b>7</b>	<b>Timber Harvesting Landbase</b>				
7.a	Deciduous	0.0	33,241.3	33,241.3	3.1%
7.b	Deciduous / Coniferous	0.0	8,416.9	8,416.9	0.8%
7.c	Coniferous / Deciduous	0.0	12,647.2	12,647.2	1.2%
7.d	Coniferous	0.0	51,066.8	51,066.8	4.7%
7.e	Deciduous w/ Conifer Understorey	0.0	6,013.0	6,013.0	0.6%
	<b>Sub-total</b>	<b>0.0</b>	<b>111,385.1</b>	<b>111,385.1</b>	<b>10.3%</b>
<b>Grand Total</b>		<b>568,060.8</b>	<b>518,078.7</b>	<b>1,086,139.5</b>	<b>100.0%</b>

**Appendix I: Phase 3 Landbase Determination Process**  
**Appendix II: Timber Zone Landbase Netdown Maps and Tables**  
**Appendix III: Private Land Reductions**  
**Appendix IV: Protected Notation Locations Across FMA Area**  
**Appendix V: Isolated Stand Analysis**  
**Appendix VI: Oil and Gas Documentation**  
**Appendix VII: Millar Western RSI Documentation**  
**Appendix VIII: Results of Sliver Removal Process**  
**Appendix IX: AVI Netdown Database Data Dictionary**  
**Appendix X: Phase 3 Netdown Database Data Dictionary**