4 Block Planning and Plot Layout

4.1 The Plot Sampling Process

The planning and implementation of plot sampling surveys involves either one cutblock or an aggregation of cutblocks. For either cutblock or aggregate sampling, follow these steps:

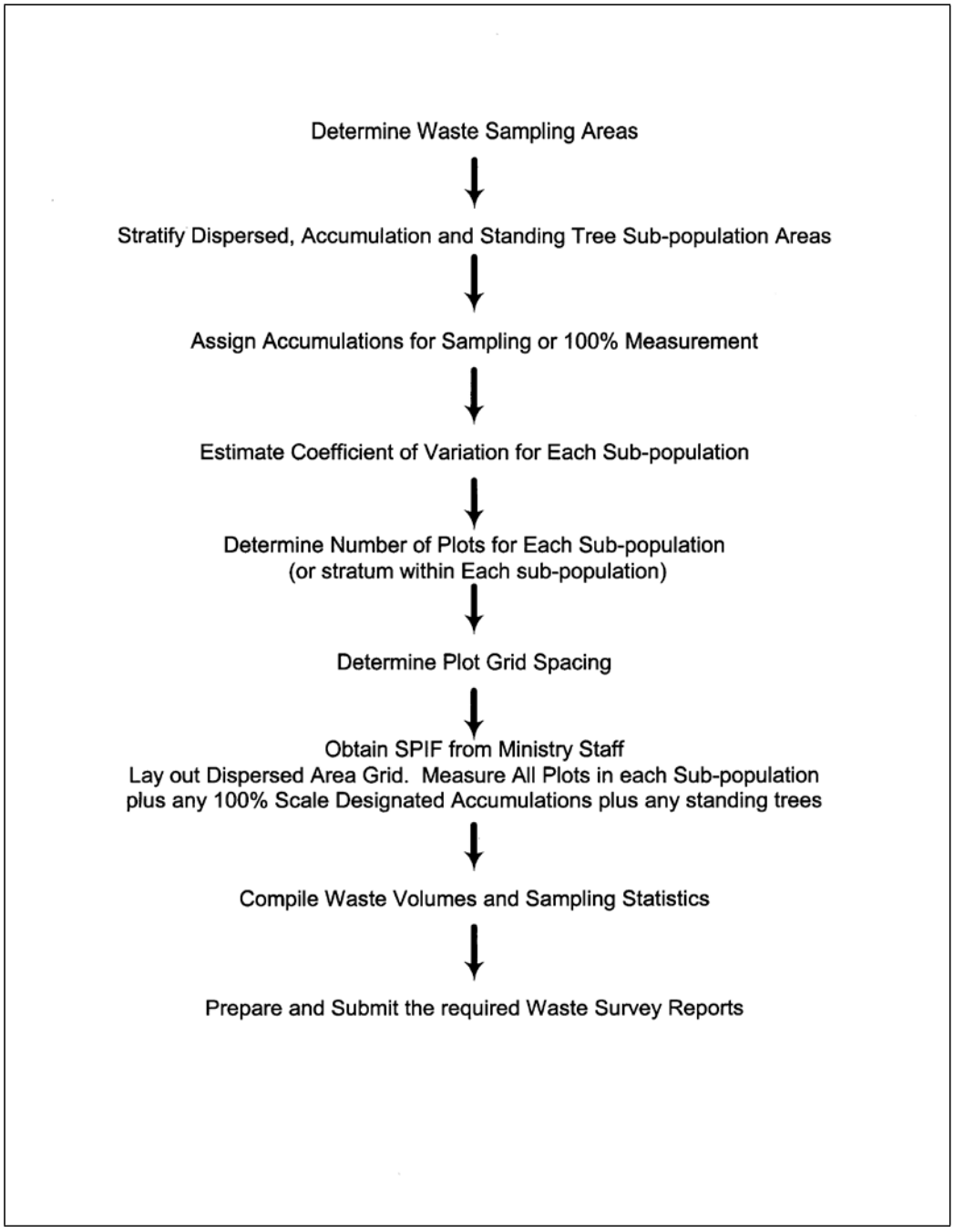

Figure 4-1 Plot Sampling Process.

4.2 Sampling Design

4.2.1 Population

The population is the volume of waste generated during the specified reporting year within the approved waste reporting unit. The size of the population depends on:

a. the option selected for the waste reporting unit,

b. the area logged in that year.

4.2.2 Sub-Populations

The population usually consists of three sub-populations: accumulated, dispersed and standing trees. Each sub-population may be subdivided into one or more strata.

Accumulated waste occurs at landings, along roadsides and at other areas in the reporting unit where logs have been yarded or skidded to and where sample plots may be established. Where sample plots cannot be safely established, or are not appropriate, volumes are either estimated or 100 percent measured (each piece measured individually).

Dispersed waste occurs on the areas from which trees or logs have been removed and where sample plots can safely be established. Dispersed areas are sampled independently of accumulation areas. The area of the rights-of-way leading into the cutblock must be included in the net area of cutblock unless the waste volume has been included in a previous waste survey or as provided under Section 4.6.2.

Standing trees are trees authorized for harvest under the cutting authority (excepting reserved trees) but at the discretion of the licence holder, are not cut and removed.

Individual standing trees that are found at different locations of the cutblock can be measured and scaled individually, and be treated as part of the dispersed sub-population. Standing tree patches will be delineated separately from the dispersed to form their own sub-population and the volumes determined with methods outlined under Section 5.3.2.

4.2.3 Stratification

Stratification can increase the precision of sub-population volume estimates, and reduce the amount of sampling required to achieve a desired level of precision.

It is therefore useful to stratify the sub-populations, where possible, by harvesting system, different logging contractor, timber type, or relative quantity of waste generated.

4.2.4 Block Survey Plan

A good block survey plan in the form of a map is essential to an efficient waste survey.

The Block Survey Plan is not required to be approved by the District Manager.

A licensee or party responsible for survey must submit a Block Survey Plan or Notification to the District Manager thirty (30) days prior to the anticipated field work providing information required by the District Manager.

Only one survey plan or notification may be submitted for each cutblock, and waste report submissions must comply with the submitted plan or notification. No alterations will be allowed to be made to the waste billing volumes.

After the field survey is completed for the block, the final Block Survey Plan map must be submitted with the waste survey reports.

The map must show the cutblock boundaries, roads, the point of commencement, strip and plot locations, and must meet ministry standards. Each area must be carefully measured by mapping and planimetry. All roads, water, swamp and other non-forest areas must be delineated on the maps and the areas measured with a planimeter.

Accumulations and standing trees not harvested should be clearly indicated on the maps.

4.2.5 Sampling Objective

The sampling objective is to estimate the total volume of waste in each sub-population to a calculated minimum level of precision, or sampling error percent (S.E. %), at the 95 percent confidence level. Generally, calculated sampling errors decrease with increased sub-population size.

The sampling error and number of plots required for each sub-population are determined from plot Tables 4-2 to 4-5 in this chapter.

4.3 Sampling Method

There are four assessment methods as outlined in 5.7.2, they are PLOT (P), 100% Measure (S), Ocular Estimate (O), and Estimate Percent (E). Anyone or any combinations of the four assessment methods may be used in a waste assessment.

In both aggregate and cutblock options, the waste volume in the dispersed and accumulation subpopulations is calculated based on fixed-area sample plots laid out systematically. For the estimated or 100 percent piece scale subpopulations, waste volumes are either estimated or 100 percent measure for each specified stratum.

The fixed-area plots are established in a systematic, staggered grid pattern in dispersed types. In roadside accumulations the plot spacing depends on the average width of the accumulation. The grid spacing will also depend on the plot size and number of plots determined for the sub-population.

For accumulations, the licensees have the option of estimating volumes. Plots which fall on hazardous piles should be relocated; however, if unsuccessful, estimates will be allowed. Areas subject to 100 percent measurement or estimation should be typed out on the maps.

This manual prescribes either a cut-block or aggregate option using a combination of either fixed-area plots, estimations and/or 100 percent measure. Any variation from this sampling method requires written approval of the Director, Timber Pricing Branch.

The safety of the surveyor must always take precedence when estimating or measuring plots, including the wearing of proper safety equipment and footwear.

4.3.1 Number of Plots (Sample Size)

The number of plots and maximum sampling error for each sub-population are determined from plot tables. There are two sets of tables each for the Coast and Interior (dispersed and accumulation areas). These tables embody certain underlying assumptions concerning the volume, relative proportions of waste, cruise volume, and are specific to a given plot size.

To use the plot tables, you need the sub-population area and the estimated coefficient of variation (C.V.). This C.V. is specific to the individual plot volumes in that sub-population area.

> If no coefficients of variation are available, use a "start up" C.V. estimate of 100 percent for the dispersed and accumulation sub-populations.

Subsequent estimates can be based on actual survey statistics. For the aggregate option, sampling proceeds as each cutblock is logged or becomes available.

4.3.2 Procedure to Determine the Number of Plots

Determine the minimum number of plots required for each sub-population as follows:

1. Determine the sub-population area (sum of stratum areas in the dispersed *or* accumulation sub-population).

2. Estimate the sub-population coefficient of variation, or use start up values.

3. From the appropriate dispersed or accumulation plot table, read the minimum number of plots required from the body of the table.

4. Read the maximum sampling error from the right-hand column of the table.

5. The minimum number of plots per stratum is 2, based on the sub-population area.

6. For the aggregate option, the number of plots for an *individual block* will be the result of the hectare to plot ratio *for all blocks in the aggregate* divided into the area of the block and rounded up to the nearest whole number, but the minimum of 2 plots per stratum still applies on *each* block.

   For example:

   If on the aggregate option you have a hectare to plot ratio of 6.2:1 and the area on one of the blocks is 41.5 ha, divide 41.5 by 6.2 to get 6.7; round up to 7 plots. If the number of plots before rounding is less than two, then at least two plots per stratum must be established on that block.

4.3.3 Grid Spacing

Follow Section 4.3.2 to determine the number of plots required.

For the cutblock option, the number of plots required for each block is taken directly from the appropriate plot table.

For the Aggregate option, the number of plots required for each block is calculated by dividing the gross area of the block by the hectare to plot ratio for the Aggregate, rounding to the nearest whole number.

For both the Cutblock and Aggregate options, the minimum number of plots per cutblock is 2, and the grid spacing is determined for each block.

Refer to the Grid Spacing Worksheet (Table 4-1). The grid spacing is calculated from the formula of SQR (10 000 X ha/plots) where SQR means "take the square root of", and should be rounded down to the next 5 m.

If necessary, grid spacing is reduced or increased, in 10 m increments, to fit the required number of plots within the cutblock boundaries.

4.4 Plot Layout

4.4.1 Dispersed

Plots for dispersed types are to be located on a systematic, staggered grid. The steps required are as follows:

1. Using the hectares and an estimate of C.V. specific to the reporting unit, look up the minimum number of plots required in either Table 4-2 (Coast) or Table 4-4 (Interior).

2. Compute the grid spacing distance (GSD) using the grid spacing worksheet (Table 4-1).

3. Locate the POC where the main road enters the cutblock, and establish the baseline in the cardinal direction which most closely parallels the contours. The POC for helicopter blocks is the most south-westerly point on the block.

4. Obtain the Starting Point Interval Factor (SPIF) from the forest district staff. The SPIF (must be in effect for the month in which primary logging for the cutblock is completed), multiplied by the GSD will determine the horizontal distance from the POC to the mapped location of the initial strip (IS). (SPIF will be randomly determined by Ministry of Forests, Lands and Natural Resource Operations staff to either be 1/4, 1/2, 3/4 or other fractions of GSD.).

5. Map the initial strip (IS) at the SPIF distance along and at right angles to the baseline from the POC.

6. Map all remaining strips at the full GSD along the baseline in both directions from the IS. Strips are mapped at right angles to the baseline.

7. Number the Strips:

    a. on blocks with North/South baselines number the strips sequentially from South to North, and

    b. on blocks with East/West baselines number the strips sequentially from West to East.

8. On odd numbered strips, locate the first two plots at one half the GSD along the strip in both directions from the baseline. Locate the remaining plots at full GSD along the strip.

9. On even numbered strips, locate one plot at the intersection of the strip and the baseline, and all remaining plots at full GSD along the strip.

10. Number the plots. Each plot in a given block should have a unique number.

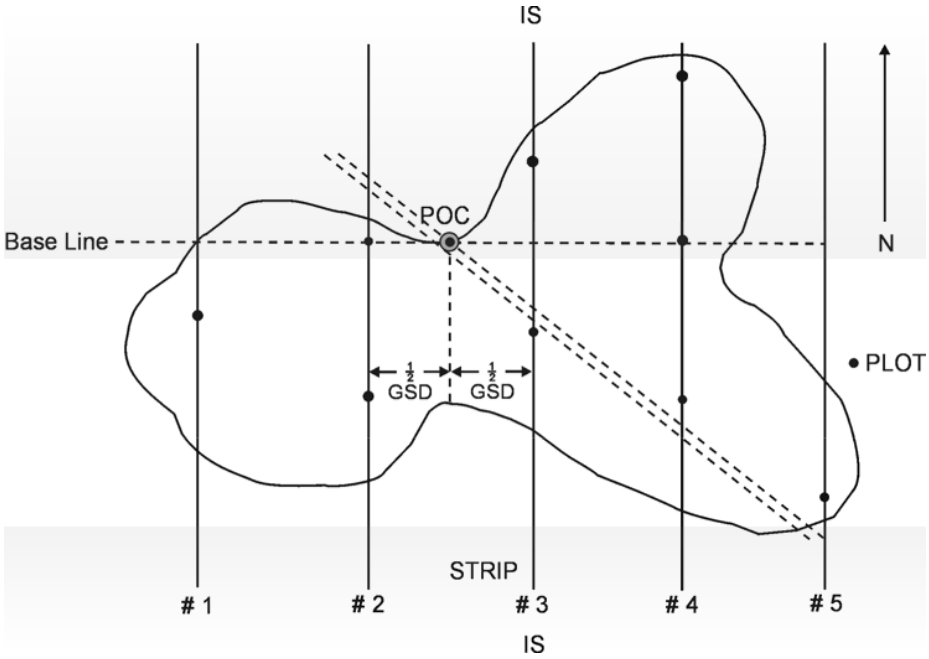

Figure 4-2 Strip and Plots Placement.

4.4.2 Roadside Accumulations

For grapple yarding roadside accumulations, the number of plots required is based on the total area of the roadside accumulations. This area is calculated by measuring the length, along the road of "one-sided" and/or for "two-sided" accumulations. The length is then multiplied by an average width for the accumulation (usually but not restricted to 10 m).

The procedures are as follows:

<table>
<tr><th>One-sided or a mixture of one and two-sided accumulations</th><th>Two-sided Accumulations</th></tr>
<tr><td>1. Start from the POC.
2. Measure the length of the one-sided accumulation; and the length of the two-sided accumulations multiplied by two.
3. Add the one-sided and two-sided accumulations together.</td><td>1. Start from the POC.
2. Measure the length of the accumulations x 2.
3. Add the widths of the accumulations on both sides of the road together.</td></tr>
<tr><td colspan="2">4. Calculate the area of the stratum as follows:
Area (ha) = (length x width) / 10,000.
5. Look up the number of plots required from Table 3 (Coast) or Table 5 (Interior).
6. Calculate the grid spacing distance (GSD) as follows:
Grid Spacing = length / number of plots required.</td></tr>
<tr><td>Example:
Total length of one-sided accumulation = 1500 m
Total length of two-sided accumulation = 750 m x 2 = 1500 m
1500 m + 1500 m = 3000 m
Area = 3000 m x 10 m = 3 ha = 15 plots (at 100% CV on the Coast)
Grid Spacing Distance = 3000 / 15 = 200 m</td><td>Example:
Total length of roadside accumulation = 3000 m x 2 = 6000
Width of roadside accumulation = 20 m (10 m on each side of the road)
Area = 6000 m x 10 m = 6 ha = 16 plots (at 100% CV on the Coast)
Grid Spacing Distance = 6000 / 16 = 375 m</td></tr>
</table>

Laying Out of the Plots

1. Start from the POC and on the right hand side of the road.

2. Using the Starting Point Interval Factor (SPIF) for the month, establish the first plot at one-quarter of the GSD, one-half of the GSD or three-quarters of the GSD along the road.

3. For one-sided or a mixture of one and two-sided accumulations, locate a full size plot on the right side of the road. For two-sided accumulations, locate a full size plot on each side of the road.

4. Break chain the end of each accumulation and resume chaining at the beginning of the next accumulation until each GSD is covered.

5. Always stay to the right hand side of the road in the direction of travel when laying out the plots. When coming to a spur, go up the spur on the right hand side. At the end of the spur, turn around and come down on the right hand side.

6. For two sided accumulations when an odd number of plots are required, establish the last plot on one side of the road. If the last digit of the cutting permit is odd, establish it on the right hand side. If the last digit of the cutting permit is even, establish it on the left hand side.

Roadside accumulations must be marked on the map so the layout can be audited. When on-site stratification is done, it must be done on a non-bias basis.

4.4.3 Spot Accumulations

Spot accumulations include high-lead, spar, or tower landings, as well as skidder, helicopter landings.

Again, the number of plots is found from Table 4-3 (Coast) or 4-5 (Interior), and the minimum number of plots per stratum is two.

The method for selecting the first spot accumulation is to use the date of the month when the surveyor first arrives on site to do the survey.

Example 1:

> 31 piles requiring 6 plots, surveyed on the 23rd of the month
> 31 / 6 = 5.17 Survey every 5th pile
>
> Select the following piles: #23, #28, #2, #7, #12, #17

Example 2:

> 11 piles requiring 3 plots, surveyed on the 30th
> 11 / 3 = 3.67 Survey every 4th pile
>
> 30 - 11 = 19; 19 - 11 = 8
>
> Select the following piles: #8, #1, #5.

4.5 Stratification Procedures for Roadside Accumulations

4.5.1 Roadside Consisting of Strip Accumulations

If the roadside accumulations consist of strips (e.g., windrows), use a rectangular plot which covers the entire width of the strip or a 50 m^2 circular plot system with plot centres located alternatively at 4 m and 11 m from the roadside, for a 15 m wide strip. Strip accumulations are normally treated as one stratum but may need to be stratified according to different levels of waste or harvesting methods.

4.5.2 Spot Accumulations Resulting From Piling Roadside Slash

Treat all spot accumulations from the same harvesting method in one stratum. The space intervals between spot piles must be treated as a separate roadside stratum.

For roadside piles where plots are established on the side of the pile, the surveyor must alternate locating the plots on the front and back of the piles selected for sampling, if it is safe to work around the back of the pile. If it is not safe to work around the back of the pile, establish the plot on the side of the pile closest to the POC for odd numbered plots and farthest away from the POC for even numbered plots.

> Landing accumulations resulting from highlead, helicopter logging, etc., are always stratified separately from the roadside spot accumulations to form their own stratum.

4.5.3 Accumulations Within Dispersed Sub-population

Accumulations found within the dispersed sub-population area which had not been previously stratified will be surveyed as part of the dispersed sub-population and all pieces that fall within a dispersed plot will be measured and recorded.

4.5.4 Debuilt Road

If a road has been debuilt, the logs and stumps pulled back from the side-slopes and scattered over the top of the deactivated road, the debuilt road must be treated as a separate accumulation stratum and sampled accordingly. The stratum code for debuilt roads is WB0X.

Table 4-1 Grid Spacing (GS) Worksheet

LICENSEE:	Date:
Waste Reporting Unit:	
Option for Measurement (either Cutblock or Aggregate):	
Estimated date of field survey:	
Estimated completion date of Primary Logging:	
Actual completion date of Primary Logging:	
Licence:	Division:
Forest District:	Region:

NOTE: Worksheet calculations will be determined upon completion of primary logging for the block. If it is certain no changes will occur in the size of the block when primary logging has been completed, then the worksheet can be submitted in advance to facilitate notice of the waste survey.

Formula for Grid Spacing = $\sqrt{10{,}000 * \frac{ha}{plots}}$

Column Number	(1)	(2)	(3)	(4)	(5)
CP & Block Number	Block Size (ha)	Plot Requirement from Table or Calculation	Ha/Plot Ratio Col. 1/Col. 2 equals to Col. 3 value	Total m² of Area in Column 3 Value of Col. 3 *10,000	Grid Spacing (m) $\sqrt{}$ value in Column 4

2003/04

Table 4-2 Coast - Dispersed Area

ESTIMATED MINIMUM NUMBER OF PLOTS (n)*
TO MEET THE SAMPLING ERROR OBJECTIVE ARE SHOWN IN BODY OF TABLE
MINIMUM PLOT REQUIREMENT PER STRATUM PER SUB-POPULATION IS TWO (2)
TABLE BASED ON TOTAL WASTE IN SUB-POPULATION = 5% OF CRUISE VOLUME.**
-WASTE COMPONENT IN SUB-POPULATION = 3% OF CRUISE VOLUME IN REPORTING UNIT.

SUB - POP AREA IN HECTARES (D)	ESTIMATED COEFFICIENT OF VARIATION % (C.V.)									SAMPLING ERROR % S.E. @ .95
	50	60	70	80	90	100	110	120	130	
1	2	2	2	2	2	2	2	2	2	N/A
5	2	2	3	4	4	5	6	7	8	N/A
9	3	4	4	6	8	9	11	13	15	N/A
11	3	4	6	7	9	11	13	16	18	N/A
13	4	5	7	9	11	13	16	18	21	N/A
15	4	5	8	10	12	15	18	21	24	N/A
17	4	6	9	11	14	17	20	23	27	N/A
19	5	7	10	12	16	19	22	26	31	N/A
21	5	8	11	14	17	20	25	29	34	N/A
23	6	8	12	15	19	22	27	32	37	N/A
25	6	9	13	16	20	24	29	35	40	38.9
30	7	10	14	18	23	28	34	40	46	36.4
35	8	11	15	20	25	31	37	44	51	34.6
40	9	12	17	22	27	34	40	48	55	33.3
45	9	13	18	23	29	36	43	51	59	32.2
50	10	14	19	24	31	38	45	54	63	31.4
55	10	15	20	26	32	40	48	56	66	30.7
60	11	15	20	27	33	41	49	58	68	30.1
70	11	16	22	28	36	44	53	62	73	29.3
80	12	17	23	30	37	46	55	65	76	28.6
90	12	17	24	31	39	48	58	68	80	28.1
100	13	18	24	32	40	49	59	70	82	27.6
110	13	18	25	33	41	51	61	72	84	27.3
120	13	19	26	33	42	52	62	74	86	27
130	13	19	26	34	43	53	64	75	88	26.8
140	14	20	27	35	44	54	65	77	92	26.6
160	14	20	27	35	45	55	66	79	92	26.2
180	14	20	28	36	46	56	68	81	94	26.6
200	14	21	28	37	46	57	69	82	96	25.8
250	15	21	29	38	48	59	71	85	99	25.4
300	15	22	30	39	49	60	73	87	101	25.1
350	15	22	30	39	50	61	74	88	103	25
400	16	22	30	40	50	62	75	89	104	24.8
500	16	23	31	40	51	63	76	90	106	24.6
800	16	23	32	41	52	63	78	93	109	24.4
1000	16	23	32	42	52	65	79	94	110	24.3
1500	16	24	32	42	53	65	80	95	110	24.1
2000	17	24	32	42	54	66	80	95	112	24.1
3000	17	24	33	43	54	66	80	96	112	24
4000	17	24	33	43	54	67	81	96	113	24
5000	17	24	33	43	54	67	81	96	113	24
7000	17	24	33	43	54	67	81	96	113	23.9
10000	17	24	33	43	54	67	81	97	113	23.9

* Based on 400 square metre plot size. For a different plot size calculate a new coefficient of variation from the following formula and then determine the probable minimum number of plots needed to achieve the sampling error @ .95 using the new C.V.

New C.V. = $\sqrt{[(C^2) * \sqrt{(Y/X)}]}$

Where: C = C.V. using old plot size (%)

Y = old plot size (m^2)

X = new plot size (m^2)

** Cruise volume in reporting unit = cruise volume per hectare * population area.

Table 4-3 Coast - Accumulation Area

ESTIMATED MINIMUM NUMBER OF PLOTS (n)*
TO MEET THE SAMPLING ERROR OBJECTIVE ARE SHOWN IN BODY OF TABLE
MINIMUM PLOT REQUIREMENT PER STRATUM PER SUB-POPULATION IS TWO (2)
-TABLE BASED ON TOTAL WASTE IN SUB-POPULATION = 9% OF CRUISE VOLUME.**
-WASTE COMPONENT IN SUB-POPULATION = 5% OF CRUISE VOLUME IN REPORTING UNIT.

SUB - POP AREA IN HECTARES (A)	ESTIMATED COEFFICIENT OF VARIATION % (C.V.)									SAMPLING ERROR % S.E. @ .95
	50	60	70	80	90	100	110	120	130	
0.25	2	2	2	2	2	2	2	2	3	N/A
0.50	2	2	2	2	2	3	3	4	5	N/A
0.75	2	2	2	3	4	4	5	6	7	N/A
1	2	2	3	4	5	6	7	8	9	N/A
1.5	2	3	4	5	7	8	9	11	13	N/A
2	3	4	6	7	9	11	13	15	17	N/A
2.5	4	5	7	9	11	13	16	19	22	N/A
3	4	6	8	10	13	15	19	22	26	55.3
3.5	4	6	8	10	13	15	19	22	26	55.3
4	4	6	8	10	13	16	19	22	26	55.3
4.5	4	6	8	10	13	16	19	22	26	55.3
5	4	6	8	10	13	16	19	22	26	55.3
5.5	4	6	8	10	13	16	19	22	26	55.3
6	4	6	8	10	13	16	19	22	26	55.3
6.5	4	6	8	10	13	16	19	22	26	55.3
7	4	6	8	10	13	16	19	22	26	55.3
7.5	4	6	8	10	13	16	19	22	26	55.3
8	4	6	8	10	13	16	19	23	26	55.3
9	4	6	8	10	13	16	19	23	26	55.3
10	4	6	8	10	13	16	19	23	26	55.3
11	4	6	8	10	13	16	19	23	26	55.3
12	4	6	8	10	13	16	19	23	27	55.3
13	4	6	8	10	13	16	19	23	27	55.3
14	4	6	8	10	13	16	19	23	27	55.3
15	4	6	8	10	13	16	19	23	27	55.3
16	4	6	8	10	13	16	19	23	27	55.3
17	4	6	8	10	13	16	19	23	27	55.3
18	4	6	8	10	13	16	19	23	27	55.3
19	4	6	8	10	13	16	19	23	27	55.3
20	4	6	8	10	13	16	19	23	27	55.3
22	4	6	8	10	13	16	19	23	27	55.3
24	4	6	8	10	13	16	19	23	27	55.3
26	4	6	8	10	13	16	19	23	27	55.3
28	4	6	8	10	13	16	19	23	27	55.3
30	4	6	8	10	13	16	19	23	27	55.3
32	4	6	8	10	13	16	19	23	27	55.3
34	4	6	8	10	13	16	19	23	27	55.3
36	4	6	8	10	13	16	19	23	27	55.3
38	4	6	8	10	13	16	19	23	27	55.3
40	4	6	8	10	13	16	19	23	27	55.3

* Based on 50 square metre plot size. For a different plot size calculate a new coefficient of variation from the following formula and then determine the probable minimum number of plots needed to achieve the sampling error @ .95 using the new C.V.

New C.V.= $\sqrt{[(C^2) * \sqrt{(Y/X)}]}$
Where: C = C.V. using old plot size (%)
Y = old plot size (m^2)
X = new plot size (m^2)

** Cruise volume in reporting unit = cruise volume per hectare * population area.

Table 4-4 Interior - Dispersed Area

ESTIMATED MINIMUM NUMBER OF PLOTS (n)*
TO MEET THE SAMPLING ERROR OBJECTIVE ARE SHOWN IN BODY OF TABLE
MINIMUM PLOT REQUIREMENT PER STRATUM PER SUB-POPULATION IS TWO (2)
-TABLE BASED ON TOTAL WASTE IN SUB-POPULATION = 2% OF CRUISE VOLUME.**
-WASTE COMPONENT IN SUB-POPULATION = 1% OF CRUISE VOLUME IN REPORTING UNIT.

SUB-POP. AREA IN HECTARES (D)	ESTIMATED COEFFICIENT OF VARIATION % (C.V.)									SAMPLING ERROR % S.E. @ .95
	50	60	70	80	90	100	110	120	130	
1	2	2	2	2	2	2	2	2	2	N/A
5	2	2	3	3	4	5	6	7	8	N/A
9	3	3	5	6	7	9	10	12	14	N/A
11	3	4	5	7	9	11	13	15	17	N/A
13	3	5	6	8	10	12	15	17	20	N/A
15	4	6	7	9	12	14	17	20	23	N/A
17	4	6	8	11	13	16	19	23	26	N/A
19	5	7	9	12	15	18	22	25	29	N/A
21	5	8	10	13	16	20	24	28	32	N/A
23	6	8	11	14	18	22	26	31	36	N/A
25	6	9	12	15	19	24	28	33	39	40
30	7	10	14	18	22	27	32	38	44	37.4
35	8	11	15	19	24	29	35	42	49	35.5
40	8	12	16	21	26	32	38	45	53	34.1
45	9	13	17	22	28	34	41	48	56	33.1
50	9	13	18	23	29	36	43	51	60	32.2
55	10	14	19	24	31	38	45	54	62	31.5
60	10	14	19	25	32	39	47	56	65	30.9
70	11	15	21	27	34	42	50	59	69	30
80	11	16	22	28	36	44	53	62	73	29.3
90	12	17	23	29	37	45	55	65	76	28.8
100	12	17	23	30	38	47	57	67	78	28.3
110	12	18	24	31	39	48	58	69	80	28
120	13	18	24	32	40	49	59	70	82	27.8
130	13	18	25	32	41	50	61	72	84	27.4
140	13	19	25	33	42	51	62	73	85	27.2
160	13	19	26	34	43	52	63	75	88	26.9
180	14	19	26	34	44	54	65	77	90	26.6
200	14	20	27	35	44	55	66	78	91	26.4
250	14	20	28	36	46	56	68	81	94	26
300	14	21	28	37	47	58	69	82	97	25.8
350	15	21	29	37	47	58	71	83	98	25.6
400	15	21	29	38	48	59	71	85	99	25.4
500	15	22	30	39	49	60	73	86	101	25.2
800	16	22	30	39	50	62	74	89	104	25
1000	16	23	31	40	50	62	75	89	105	24.9
1500	16	23	31	40	51	63	76	90	106	24.7
2000	16	23	31	41	51	63	76	91	107	24.7
3000	16	23	31	41	52	64	77	92	107	24.6
4000	16	23	31	41	52	64	77	92	108	24.6
5000	16	23	31	41	52	64	77	92	108	24.5
7000	16	23	31	41	52	64	77	92	108	24.5
10000	16	23	31	41	52	64	77	92	108	24.5

* Based on 400 square metre plot size. For a different plot size calculate a new coefficient of variation from the following formula and then determine the probable minimum number of plots needed to achieve the sampling error @ .95 using the new C.V.

New C.V.= $\sqrt{[(C^2) * \sqrt{(Y/X)}]}$
Where: C = C.V. using old plot size (%)
Y = old plot size (m^2)
X = new plot size (m^2)

** Cruise volume in reporting unit = cruise volume per hectare * population area.

Table 4-5 Interior - Accumulation Area

ESTIMATED MINIMUM NUMBER OF PLOTS (n)*
TO MEET THE SAMPLING ERROR OBJECTIVE ARE SHOWN IN BODY OF TABLE
MINIMUM PLOT REQUIREMENT PER STRATUM PER SUB-POPULATION IS TWO (2)
-TABLE BASED ON TOTAL WASTE IN SUB-POPULATION = 15% OF CRUISE VOLUME.**
-WASTE COMPONENT IN SUB-POPULATION = 9% OF CRUISE VOLUME IN REPORTING UNIT.

SUB-POP. AREA IN HECTARES (A)	ESTIMATED COEFFICIENT OF VARIATION % (C.V.)									SAMPLING ERROR % S.E. @ .95
	50	60	70	80	90	100	110	120	130	
0.25	2	2	2	2	2	2	2	2	3	N/A
0.50	2	2	2	2	3	3	4	4	5	N/A
0.75	2	2	3	3	4	5	6	7	8	N/A
1	2	3	3	4	5	6	7	9	10	N/A
1.5	3	4	5	6	7	9	11	13	15	N/A
2	4	5	6	8	10	12	14	17	20	N/A
2.5	4	6	8	10	12	15	18	21	24	N/A
3	5	7	9	12	14	18	21	25	29	52
3.5	5	7	9	12	15	18	21	25	29	52
4	5	7	9	12	15	18	21	25	29	52
4.5	5	7	9	12	15	18	21	25	29	52
5	5	7	9	12	15	18	22	25	29	52
5.5	5	7	9	12	15	18	22	25	29	52
6	5	7	9	12	15	18	22	25	30	52
6.5	5	7	9	12	15	18	22	25	30	52
7	5	7	9	12	15	18	22	25	30	52
7.5	5	7	9	12	15	18	22	25	30	52
8	5	7	9	12	15	18	22	25	30	52
9	5	7	9	12	15	18	22	25	30	52
10	5	7	9	12	15	18	22	25	30	52
11	5	7	9	12	15	18	22	26	30	52
12	5	7	9	12	15	18	22	26	30	52
13	5	7	9	12	15	18	22	26	30	52
14	5	7	9	12	15	18	22	26	30	52
15	5	7	9	12	15	18	22	26	30	52
16	5	7	9	12	15	18	22	26	30	52
17	5	7	9	12	15	18	22	26	30	52
18	5	7	9	12	15	18	22	26	30	52
19	5	7	9	12	15	18	22	26	30	52
20	5	7	9	12	15	18	22	26	30	52
22	5	7	9	12	15	18	22	26	30	52
24	5	7	9	12	15	18	22	26	30	52
26	5	7	9	12	15	18	22	26	30	52
28	5	7	9	12	15	18	22	26	30	52
30	5	7	9	12	15	18	22	26	30	52
32	5	7	9	12	15	18	22	26	30	52
34	5	7	9	12	15	18	22	26	30	52
36	5	7	9	12	15	18	22	26	30	52
38	5	7	9	12	15	18	22	26	30	52
40	5	7	9	12	15	18	22	26	30	52

* Based on 50 square metre plot size. For a different plot size calculate a new coefficient of variation from the following formula and then determine the probable minimum number of plots needed to achieve the sampling error @ .95 using the new C.V.

New C.V.= $\sqrt{[(C^2) * \sqrt{(Y/X)}]}$
Where: C = C.V. using old plot size (%)
Y = old plot size (m^2)
X = new plot size (m^2)

** Cruise volume in reporting unit = cruise volume per hectare (V) * population area (H).

4.6 Road Rights-of-Way

4.6.1 Reporting

Waste assessments are required on road rights-of-way. Licensees must ensure the waste reported on the road rights-of-way is attributed to the correct timber mark or road permit mark. If a road belongs to a Master Road Permit, then the Master Road Permit mark shall be used.

4.6.2 Procedures

The road right-of-way is the access road leading into the cutblock from the closest previously logged cutblock or the preceding road junction with the main road. There are two surveying options:

1. No plot sampling is required. The area of the road right-of-way area (from edge of the travelled surface to edge of the timber) is included with the dispersed sub-population area of the cutblock.

2. Sample with plots (usually 50 m^2) in a separate roadside stratum. The stratum code to be used is OT0X.

The procedure for locating the plots is to start from the POC for the cutblock (where the road enters the cutblock) and put in rectangular plots covering the width of the area between the edge of the road and the edge of the timber using the right hand rule.

4.7 Partial Cutting (Variable Retention) Cutblocks

Partial cutting (variable retention) cutblocks contain leave trees in groups (over 0.25 ha in size is termed group retention) and/or as dispersed individual trees or small groups of a few trees (dispersed retention).

It is important that a proper map of the cutblock which shows leave areas and corridors be obtained and used as the Block Survey Plan.

For full surveys, proper stratification of the cutblock is required. Leave areas and corridors should be stratified out. Any stratum that has trees removed must be sampled.

New stratum codes for variable retention cutblocks have been created, and they are "G" for group retention, and "D" for dispersed retention. The use of smaller than 400 m^2 plot size is permitted for these strata. If a smaller plot size is used, the C.V. must be recalculated and adjusted using the formula indicated in the bottom of the plot tables.