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May 11, 2023

BY EMAIL

To: Regional Executive Directors

From: Allan Bennett, Director, Timber Pricing Branch

Re: Amendment No. 8 to the *Provincial Logging Residue and Waste Measurement Procedures Manual – Interior Version*

I hereby approve Amendment No. 8 to the *Provincial Logging Residue and Waste Measurement Procedures Manual – Interior Version*.

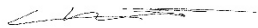
The manual can be found here:

[Provincial Logging Residue and Waste Measurement Procedures Manual – Interior Version](#)

The purpose of this amendment is to update the *Provincial Logging and Waste Measurement Procedures Manual – Interior Version*, which provides:

- A simplified system of due dates for waste surveys.
- Restrictions on modifying survey data in EForWasteBC to improve survey integrity.
- Reference to the Waste Assessment Regulation regarding penalties for late waste submissions.
- Minor changes in survey and reporting procedures to improve efficiency for surveyors and auditors.
- Minor clarifications of procedures to provide unambiguous procedures, where the previous language open to multiple interpretations.

Amendment No. 8 comes into effect on May 15, 2023.



Allan W. Bennett, RPF
Director
Timber Pricing Branch

pc: Melissa Sanderson, Assistant Deputy Minister, Timber, Range, and Economics Division

Amendment No. 8 – Provincial Logging Residue and Waste Procedures Manual – Interior Version Highlights

Section, Table or Appendix Number	Description
1.3.4	Procedures have been updated for FLTCs under the Licence to Cut Regulation, Protecting Communities from Wildfire
1.6.3	Restrictions on revising plot data in EForWasteBC are clarified or introduced. The most current version of EForWasteBC must be used to collect plot data.
3.2	Grade 6 and Z are not to be tallied unless required by licence utilization. Waste rates for Grade 6 are clarified.
4.2.1	Submission timelines have been revised and simplified.
4.2.2	The Waste Assessment Regulation is in effect for both interim submissions and final submissions.
4.3	Reporting requirements have been revised.
4.3.2	Eligibility criteria for using district averages instead of a field survey have been revised.
5.4.2	Prediction plot volumes include an estimate of the combined volume of grades 1, 2, and 4.
6.2.1	There can only be minor, justifiable differences between the estimated and the final submission areas.
6.3.1	Requirements for composition of aggregate populations have been revised.
6.4	Clarification for treatment of non-sampled waste assessment areas is added.
6.4.1.3	The stratum codes for standing waste must be consistent within a population.
6.7.2	Wording is adjusted to align with new functionality in HRC.
7.1, 7.2	Methods to determine waste assessment area have been revised for improved clarity.
8 (throughout this chapter)	A simplified process is provided for aggregate populations to use a single PLC date to determine the plot locations for all waste assessment areas in the population.
8.4.1	The formula for plot grid spacing now excludes external right of way areas to provide a more efficient plot layout method.
8.5.4	The procedure for selecting pile plots is updated to provide a consistent method.
8.6.1.2	The procedure for locating right of way plots is revised for clarity.
8.10	The stratum codes for cold decks must be consistent within a population.
9.2.4	Plot establishment and marking requirements are revised to provide clarity.
9.3.4	Description of tallying partially buried pieces is modified for clarity.
9.3.5	Surveys will be rejected if surveyors do not tally all accessible pieces in

	a measure plot.
9.4.1	Clarification is added for tallying Grade 6 and Grade Z.
9.7.3	Clarification is added for the use of partial cutblock waste assessment areas.
10.1.2	The Cutting Permit Summary report is used in this section.
11.3.1	A survey may be rejected if stratum areas are incorrect.
Appendix 1	Definition of “Net Waste Area” is revised for clarity. More detailed calculation methods are included elsewhere in the manual. A definition of “Waste Assessment Area” is provided.
Appendix 4	Heading has been corrected.
Appendix 5	The updated formula for calculating dispersed stratum inter-plot grid spacing is included.
Appendix 12	ECAS ID is not required on the post-harvest certification form.

TIMBER PRICING BRANCH

Provincial Logging Residue and Waste Measurement Procedures Manual – Interior Version

Effective: April 1, 2019

Includes Amendments

Amendment No. 1
Amendment No. 2
Amendment No. 3
Amendment No. 4
Amendment No. 5
Amendment No. 6
Amendment No. 7
Amendment No. 8

Effective Date

July 22, 2019
September 1, 2020
April 1, 2021
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November 15, 2021
April 1, 2022
November 21, 2022
May 15, 2023



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Table of Contents

1.	Administration.....	1-1
1.1	Introduction.....	1-2
1.2	Authority and Obligations	1-3
1.2.1	Authority.....	1-3
1.2.2	Continuing Liability	1-3
1.3	Applicability	1-4
1.3.1	Application Dates	1-4
1.3.2	Scale Based Cutting Authorities.....	1-4
1.3.3	Cruise Based Cutting Authorities.....	1-4
1.3.4	Forestry Licence to Cut Issued Under <i>Licence to Cut Regulation Section 1 - Protecting Communities from Wildfire</i>	1-4
1.4	Responsibility	1-6
1.4.1	Timber Pricing Branch	1-6
1.4.2	Area Director of Pricing and Tenures.....	1-6
1.4.3	District Manager	1-7
1.4.4	Timber Sales Manager.....	1-7
1.4.5	Licensees	1-7
1.5	Waste Assessor Qualifications	1-9
1.5.1	Waste Sample Planning.....	1-9
1.5.2	Field Survey.....	1-9
1.5.3	Survey Compilation and Reporting	1-9
1.6	Data Collection and Compilation Programs.....	1-10
1.6.1	The Waste System	1-10
1.6.2	The Harvest Residue Compiler.....	1-10
1.6.3	EForwasteBC.....	1-10
2.	Waste Relief.....	2-1
2.1	Applications	2-2
2.1.1	Initiating an Application for Waste Relief	2-2

2.1.2 Processing of Application.....	2-2
2.1.3 Final Waste Relief Determination	2-3
3. Timber Merchantability Specifications and Waste Monetary Billing	3-1
3.1 Timber Merchantability Specifications	3-2
3.2 Waste Monetary Billing.....	3-3
3.2.1 Waste Amount Payable	3-3
3.2.2 Waste Rate	3-4
3.3 Waste Benchmarks	3-6
3.3.1 Benchmark Levels	3-6
3.3.2 Benchmark Eligibility.....	3-6
3.3.3 Benchmark Calculations and Billings	3-7
3.3.4 WMRF and Billing	3-7
4. Reporting Structure, Timeframes, and Requirements	4-1
4.1 Reporting Structure.....	4-2
4.1.1 Single Waste Assessment Area Population Reporting Units	4-2
4.1.2 Aggregate Population Reporting Units.....	4-2
4.2 Timeframes	4-3
4.2.1 Submission Timelines.....	4-3
4.2.2 Overdue Waste Assessments and Reports.....	4-5
4.2.3 Waste Survey Extensions in 2022	4-5
4.3 Reporting Requirements	4-6
4.3.1 Material Disposed of Prior to Waste Assessments	4-7
4.3.2 Waste Assessment Areas Using District Averages	4-7
5. Sample Populations and Sampling Designs	5-1
5.1 Overview.....	5-2
5.2 Sample Populations	5-3
5.3 Sampling Designs	5-4
5.3.1 Single Waste Assessment Area or Aggregate Population Sampling Designs...	5-4
5.4 Sampling Designs Within Single Waste Assessment Area and Aggregate Populations	5-5
5.4.1 Simple Random Sampling	5-5
5.4.2 Ratio Adjustment Sampling.....	5-5
6. Sample Plans	6-1
6.1 Waste Sample Plan Development and Implementation.....	6-2

6.2	Sample Plan Composition.....	6-3
6.2.1	Waste Assessment Area.....	6-3
6.3	Population Structure	6-4
6.3.1	Aggregate Populations.....	6-4
6.4	Stratification	6-5
6.4.1	Subpopulations	6-5
6.5	Sample Size and Number of Plots	6-7
6.5.1	Non-Sampled Waste Assessment Areas in an Aggregate	6-7
6.6	Amendments	6-8
6.7	Implementation	6-9
6.7.1	Single Waste Assessment Area Sample Plans.....	6-9
6.7.2	Aggregate Sample Plans	6-9
6.8	Waste Assessment Area Survey Map	6-11
6.8.1	Waste Assessment Area Survey Map Requirements.....	6-11
7.	Waste Area Determination	7-1
7.1	Principles	7-2
7.2	Net Waste Area Calculation	7-3
7.3	Strata and Road Right of Way Areas.....	7-5
7.3.1	Strata Areas.....	7-5
7.3.2	Road Right of Way Areas.....	7-5
7.4	Multiple Timber Mark Waste Assessment Areas	7-6
7.4.1	Waste Assessment Areas Containing Road Permit Area	7-6
7.4.2	Cutblock Authorized Under Two or More Tenures	7-6
8.	Waste Assessment Area Planning and Plot Layout	8-1
8.1	The Plot Sampling Process	8-2
8.2	Sampling Method.....	8-3
8.3	The Right-Hand Rule.....	8-4
8.4	Dispersed Strata Plot Layout	8-5
8.4.1	Plot Spacing (Grid Size).....	8-5
8.4.2	Plot Location.....	8-5
8.4.3	Plot Allocation.....	8-8
8.5	Spot Accumulation Stratification and Plot Layout.....	8-10
8.5.1	Stratification	8-10

8.5.2	Sampling Dispersed Spot Accumulations	8-11
8.5.3	Numbering Procedures	8-11
8.5.4	Sampling Method and Procedures	8-12
8.6	External Road Right of Way and Roadside Strata Plot Layout.....	8-15
8.6.1	Road Right of Way External to a Cutblock.....	8-15
8.6.2	Roadside Stratum Within a Waste Assessment Area	8-16
8.7	Strip Accumulations	8-19
8.8	Landings	8-20
8.8.1	Establishing Plots	8-20
8.9	Debuilt Road.....	8-21
8.9.1	Sample with the Dispersed Stratum.....	8-21
8.9.2	Sample as a Unique Stratum.....	8-21
8.10	Cold Decks.....	8-22
8.11	Partial Cut (Variable Retention) Waste Assessment Areas	8-23
9.	Field Procedures	9-1
9.1	Overview.....	9-2
9.2	Plot Establishment	9-3
9.2.1	Plot Sizes	9-3
9.2.2	Locating Dispersed Plots Using Conventional Methods.....	9-4
9.2.3	Establishing Dispersed Plots Using GPS Technology	9-4
9.2.4	Plot Establishment and Marking.....	9-4
9.2.5	Piece Numbers	9-6
9.2.6	Establishing Border Plots or Moving Plots	9-6
9.2.7	Waste Survey Safety Procedures	9-8
9.3	General Requirements	9-9
9.3.1	Material to be Measured	9-9
9.3.2	Classifying Pieces	9-9
9.3.3	Avoidable and Unavoidable Waste Classification	9-9
9.3.4	Piece Estimates	9-11
9.3.5	Measure Factor	9-11
9.4	Measurement Protocol and Standards	9-13
9.4.1	Measurement and Recording Standards	9-13
9.4.2	Minimum Measurement Requirements	9-13

9.4.3 Lengths	9-14
9.4.4 Piece Diameters	9-15
9.4.5 Deductions	9-16
9.4.6 Grading Pieces	9-16
9.5 Kind and Measurement of Material	9-18
9.5.1 Logs	9-18
9.5.2 Trees and Standing Waste	9-19
9.5.3 Slabs.....	9-22
9.5.4 Stumps	9-23
9.5.5 Bucking Waste.....	9-28
9.5.6 Forks	9-33
9.5.7 Breakage	9-35
9.5.8 Cold Decks	9-36
9.5.9 Coarse Woody Debris.....	9-36
9.5.10 Special Cases	9-36
9.6 Data Entry Requirements.....	9-38
9.6.1 Cutblock Header Information.....	9-38
9.6.2 Waste Stratum Codes.....	9-41
9.6.3 Completion of the Plot Tally Card	9-44
9.7 Field Standards	9-52
9.7.1 Field Equipment and Supplies.....	9-52
9.7.2 Field Survey Standards.....	9-52
9.7.3 Partial Cutblock Waste Assessment Areas.....	9-53
10. Simplified Waste Survey.....	10-1
10.1 Simplified Waste Survey	10-2
10.1.1 Introduction	10-2
10.1.2 Eligibility.....	10-2
10.1.3 Waste Volume Calculation.....	10-3
10.1.4 Species, Grade, and Classification	10-3
10.1.5 Population, Subpopulation, and Stratum.....	10-3
10.1.6 Reporting.....	10-4
11. Quality Assurance	11-1
11.1 Check Surveys	11-2

11.1.1	Introduction	11-2
11.1.2	Objectives	11-2
11.1.3	Check Survey Timing.....	11-2
11.2	Check Survey Standards and Procedures	11-3
11.2.1	Field Check Requirements	11-3
11.2.2	Field Checking Standards.....	11-4
11.2.3	Acceptability of Check Survey Results.....	11-7
11.2.4	Non-Compliance with Check Survey Standards	11-7
11.2.5	Dispute Resolution	11-7
11.2.6	Dispute Resolution (BCTS).....	11-8
11.3	Waste Submission Review	11-9
11.3.1	Office Review Standards.....	11-9
11.3.2	Processing Waste Volume Estimates	11-9
12.	Appendices	12-1

Appendices

Appendix 1 Glossary	12-2
Appendix 2 WMRF and Billing Calculations	12-8
Appendix 3 Sampling Population Flowchart.....	12-9
Appendix 4 Plot Planning Tables for Single and Aggregate Populations.....	12-10
Appendix 5 Dispersed Stratum Grid Spacing Worksheet	12-13
Appendix 6 Net Waste Area Example Calculation	12-14
Appendix 7 Example Waste Assessment Area Survey Map.....	12-17
Appendix 8 Waste Survey Plot Tally Card	12-18
Appendix 9 Slope Distances for 7.98m plot radius	12-20
Appendix 10 Bucking Waste Grading Matrix and Field Card	12-21
Appendix 11 Best Practices for Establishing Plots Using GPS.....	12-23
Appendix 12 Waste and Residue Post Harvest Certification - Interior.....	12-25

List of Figures

Figure 1 Diagram of Road Prism.....	7-4
Figure 2 Example Strip and Plot Placement Using a 50% SPIF	8-8
Figure 3 Example of Aggregate Plot Allocation Process	8-9
Figure 4 Example of Unavoidable Waste.....	9-10
Figure 5 Measure Factor.....	9-12
Figure 6 Measuring Shattered Ends.....	9-15
Figure 7 Example of a Log Measured as a Single Piece	9-18
Figure 8 Measuring Slabs	9-22
Figure 9 Avoidable and Unavoidable Waste.....	9-25
Figure 10 Examples of Windfall Stumps	9-28
Figure 11 Examples of Bucking Waste	9-29
Figure 12 Examples of Severely Deformed Bucking Waste.....	9-30
Figure 13 Example of Charred Wood.....	9-32
Figure 14 Example of Scorched Wood.....	9-33
Figure 15 Example of Forked Bucking Waste	9-34
Figure 16 Examples of Breakage.....	9-35

List of Tables

Table 3-1 Interior Timber Merchantability Specifications.....	3-2
Table 3-2 The Disposition of Residue and Waste Volumes in Monetary Billing.....	3-3
Table 3-3 Interior Benchmark Levels.....	3-6
Table 4-1 Submission Timelines	4-3
Table 6-1 Waste Assessment Area Survey Plan Map and Final Waste Submission Map Requirements	6-12
Table 8-1 Roadside Stratum Plot Location Procedure	8-17
Table 9-1 Cutblock Header Data Format	9-38

Table 9-2 Waste Type Codes.....	9-41
Table 9-3 Waste Stratum Harvest Method Codes	9-42
Table 9-4 Waste Stratum Assessment Method Codes.....	9-42
Table 9-5 Plot Size Codes	9-43
Table 9-6 Waste Stratum Sub Stratification Codes	9-43
Table 9-7 Standing Tree Stratum Codes.....	9-44
Table 9-8 Plot Tally Card Header Description.....	9-45
Table 9-9 Plot Tally Card Piece Description.....	9-46
Table 9-10 Deduction Descriptions.....	9-50
Table 9-11 Optional Outside Plot Measurement Descriptions	9-50
Table 9-12 Comment Codes	9-51
Table 11-1 Net Volume and Value.....	11-4
Table 11-2 Individual Parameters.....	11-5
Table 11-3 Hand Traverse Plot Location Standards.....	11-6
Table 11-4 Office Review Standards.....	11-9

The contract is supervised by a qualified receiver (QR) who is a Government of BC employee.

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4) The amount of timber to be retained is described in the contract.

Where the conditions in this section are met, the waste assessment is determined using one of the methods below:

- 1) A waste survey is performed, such that:
 - a) The dispersed subpopulation is sampled using sampling methods described in the contract,
 - b) The accumulation subpopulation is sampled using single waste assessment area sampling methods described in other sections of this manual, or
- 2) District averages may be used for the entire waste assessment area if eligible under Section 4.3.2.

Cut pieces that may be required to meet coarse woody debris requirements are counted as avoidable waste and are included in the waste benchmarks.

Standing trees are not tallied as waste within these treatment areas. Previously existing windfall trees that are specified in the contract to be treated (branches removed) and left on the harvest site are not tallied as waste.

The District Manager may require the contract holder to conduct a full waste survey under other sections of this manual if contract requirements are not met.

1.6 Data Collection and Compilation Programs

To support the collection and compilation of waste data, the Ministry of Forests, Lands, Natural Resource Operations and Rural Development maintains three software programs: the Waste System, the Harvest Residue Compiler (HRC), and EForwasteBC.

1.6.1 The Waste System

The Waste System is used to submit waste information, generate reports and upload data into the Harvest Billing System for billing.

1. Access is provided through the Waste System application located on the Timber Pricing Branch website.
2. The system can be accessed at:
<https://apps.nrs.gov.bc.ca/ext/waste-for/>
3. Users may follow the procedures in the *Waste System User Procedures Manual* at:
<http://www.for.gov.bc.ca/hva/rh/rwtraining/>

1.6.2 The Harvest Residue Compiler

The Harvest Residue Compiler (HRC) is used by waste planners to create waste sampling plans, collect and compile waste assessment area and population information and export data to the Waste System.

1. HRC is available at:
<https://apps.nrs.gov.bc.ca/pub/hrc/>
2. Users may follow the procedures in the *Harvest Residue Compiler User Guide* on the Timber Pricing Branch website.

1.6.3 EForwasteBC

EForwasteBC (EFW) is an iPad-based software application used by waste surveyors to collect waste assessment area survey information.

1. EForwasteBC is available from the Apple App store.
2. A user manual is available on the Timber Pricing Branch website.
3. The most recent available version of EForWasteBC must be used to collect survey information.
4. The following data changes are restricted:
 - a. Plot data changes must be rare and justifiable. A rationale with signature must be

provided for specific changes, where supported by the EForWasteBC version in use. To ensure accurate information is submitted, as required by the Act, internal company audits must be done before survey data is submitted to government.

- b. A plot can be created, and data can be entered only in the field at the established plot location.
- c. Plots can only be deleted where they were entered in error (e.g., a typo).
- d. Plot prediction volumes cannot be changed after the original estimate is entered.
- e. Measure factors can only be changed where they were entered in error.
- f. Other plot data can only be changed where they were entered in error.
- g. An EForWasteBC file for a survey file must not be deleted. A survey can only be submitted using data that was collected in the field at the appropriate plot locations. (Data cannot be re-typed by hand after the original data was collected. Merged files are acceptable where multiple surveyors worked on the same population). Where more than one surveyor worked on a population, the original EFW files must be provided upon request.

3.2 Waste Monetary Billing

Waste volumes are measured and billed monetarily in accordance with the following table.

Table 3-2 The Disposition of Residue and Waste Volumes in Monetary Billing

Table Effective April 1, 2019 (Valid for All Species)							
Waste Type	Grade	Avoidable			Unavoidable		
		Measure / Record	Rate	AAC	Measure / Record	Rate	AAC
Sawlog	1 and 2	Yes	Full \$ ¹	Yes	Yes	\$0.00	Yes
Lumber Reject (Green or Dead and Dry)	4	Yes	\$0.25	Yes	Yes	\$0.00	Yes
Undersize	6	Do not tally unless mandatory utilization ²	\$0.25 ³	No	Do not tally unless mandatory utilization ²	\$0.00	No
Firmwood Reject	Z	Do not tally	\$0.00	No	Do not tally	\$0.00	No

1: Full Waste Rate (\$/m³) from section 3.2.2

2: **Do not tally** unless required to be measured by the cutting authority document.

3: Except where the upset stumpage rate is determined under section 6.2.1(1)(a) and (b) and 5.1.1(4) of the Interior Appraisal Manual.

3.2.1 Waste Amount Payable

For merchantable Crown timber that is not cut and removed, the amount payable is calculated by multiplying the volumes of avoidable waste reported in a waste assessment by the applicable waste rate.

Unavoidable waste volumes will not result in amounts payable but will be included in the harvested volume for cut control purposes when applicable in accordance with the *Forest Act*.

4.2 Timeframes

The completion and submission of waste surveys are linked to the **PLC date** and the seasonal ability to complete field measurements. Waste surveys cannot be completed when snow is present in sufficient quantities to prevent the accurate measurement and grading of waste pieces.

4.2.1 Submission Timelines

Each waste assessment area has a unique due date for final submission to the Waste System, based on its PLC date. When building a survey population, care must be taken to ensure that none of the waste assessment areas within **an aggregate** population will be submitted late. **Survey plans, interim submissions and final submissions to the Waste System must be submitted within the timelines in Table 4-1, below.**

Table 4-1 Submission Due Dates

Extensions will not be granted on these submission due dates.

Population Format	Submit Sample Plan to District Manager?	Initial Sample Plan Due Date	Waste Assessment Area Survey Map Due Date	Interim Submission Due Date	Compilation and Submission into the Waste System Due Date
Single Waste Assessment Area	No	N/A	A minimum of 1 day before the survey	30 days after survey date.	12 months after PLC.
Aggregate Population	Yes	A minimum of 7 days before starting the field survey.	A minimum of 1 day before the survey.	30 days after survey date.	12 months after PLC.
Simplified Waste Survey				n/a	12 months after the earliest PLC in the population.
Surveys using District Averages				n/a	12 months after PLC.

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Field surveys must be coordinated to allow sufficient snow-free time for an interim submission and field audit as may be required by ministry staff, prior to the following activities:

1. The commencement of any silvicultural site treatments.
2. The reduction of the fuel hazard as required by the Wildfire Regulation section 12.1, or as required by the WUI practice requirement.

The activities above may commence 30 snow-free days after the interim submission where:

1. Ministry staff have not indicated that a field audit is planned for the cutblock.

The activities above may commence earlier than 30 snow-free days where:

1. Ministry staff have indicated that a field audit has met the standards in this manual and no further audit is planned.
2. Ministry staff have received and reviewed an interim or final submission and indicated that the cutblock will not be field audited.
3. The randomized block selection identified that the cutblock is a non-sample block in an aggregate population.
4. The endorsed HRC sampling plan identifies the cutblock as not requiring any plots.

Submissions must be complete and accurate to be considered submitted. Hazard abatement or site prep must not be conducted on a cutblock with a waste survey in rejected status, or where ministry staff have indicated that the cutblock will be field audited, or where ministry staff have indicated that the cutblock does not meet standards in this manual.

Where interim submissions are submitted later than September 15, the licensee accepts that hazard abatement or site prep will be delayed until a snow free period of at least 30 days for ministry checking has been provided. Ministry staff will coordinate with licensees if more time is required to conduct field audits on specific cutblocks.

Under the above timelines, seasonal snow will not restrict completion timelines, and extensions to the above due dates will not be granted. Extensions for a final aggregate submission to the waste system will not be granted.

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In accordance with Table 4-1, survey **plot** data for individual waste assessment areas must be submitted to the Natural Resource District within 30 days after the survey date. The interim submission must include:

1. Survey data (.efw file),
2. **Marked up original survey plan map** with all information that is required on the final map.

It may have hand-written notes or iPad notations.

3. Stratum areas, and any supporting information that will affect compiled volumes (billable and cut control) and grades.

Woodlot licences and Community Forest Agreements must define the PLC date and submit waste surveys at least once for each year and each cutblock in which harvesting occurred.

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4.2.2 Overdue Waste Assessments and Reports

The Waste Assessment Regulation is in effect. The Minister or their delegate may issue penalties for late waste assessments:

[Waste Assessment Regulation \(gov.bc.ca\)](http://gov.bc.ca)

Late submission of a waste survey may also result in billing delays.

For the purposes of the Waste Assessment Regulation, interim submissions and submissions to the Waste System are both considered to be proposed waste assessments. As such, late waste penalties may be applied if timelines for either of these are not met.

Where the holder of an agreement, other than an agreement entered into with the timber sales manager, does not complete the waste assessment and submit it to the District Manager as required under section 4.2, the District Manager may, in a notice given to the licensees, take actions to complete and submit a waste assessment for a block or blocks. The District Manager may complete a survey or hire a contractor and require the holder to pay the costs incurred in carrying out the assessment.

Where the holder of an agreement entered into with the Timber Sales Manager that is required by that agreement to conduct a waste assessment, fails to conduct that waste assessment, the Timber Sales Manager may carry out the assessment, and in a notice given to the holder, may require the holder to pay the costs incurred by the Timber Sales Manager in carrying out the assessment.

4.2.3 Waste Survey Extensions in 2022

Timelines for compilation and submission into the Waste System have been extended in 2022. Surveys that were required by this manual to be submitted in June 30, 2022 or September 15, 2022 are now due on December 31, 2022.

4.3 Reporting Requirements

Waste assessments must be surveyed and submitted to the Waste System and include the items outlined below:

1. Licensees must enter and submit the data into the Waste System for a waste assessment area as required in section 4.2.
2. A final survey map for each waste assessment area as required in Table 6-1.
3. **The Timber Pricing Branch Area Calculator must be included in the submission (or an Excel worksheet acceptable to the Area Director of Pricing and Tenures).**
4. A post-harvest certification that reconciles remaining trees, standing waste, and reserved timber in the final appraisal or reappraisal. See section 9.5.2 and Appendix 12 for details describing the post harvest condition of the waste assessment area.
 - a. **This form is not required for cutblocks within cutting authorities that are billed using tabular rates, since standing waste does not apply.**
 - b. **This form is not required for cutblocks within BCTS tenures, since post-harvest reappraisal does not apply and all uncut trees that remain within the cutting authority area are tallied as standing waste.**
 - c. **This form is required for non-sample cutblocks within an aggregate population.**
5. The following files must be uploaded into the Waste System using zip files:
 - a. The final version of the sample plan report from HRC,
 - b. The Original Aggregate Sample Plan,
 - c. The EFW file, and
 - d. The HRC file used for compilation.
 - e. Original survey map.
 - f. **Plot prediction report from EForWasteBC.**
6. If the person submitting the survey information into the Waste System is not a Registered Forest Professional, an endorsed cover letter from a Registered Forest Professional accepting responsibility for the submission information must be submitted. This letter must include the Registered Forest Professional's designation and registration number.
7. The agreement between parties when a population contains waste assessment areas from different client codes.

HRC, EFW files, GPS shapefiles, PRP tables, traverse notes, and plot cards will be stored by the Licensee and made available to the Ministry upon request.

4.3.1 Material Disposed of Prior to Waste Assessments

The procedures in this section do not supersede the requirement to complete a survey to the applicable standards described in this manual. It is a contravention of the Act to burn or dispose of timber before requirements or approvals in this manual are achieved.

If waste materials within any strata of a waste assessment area are burnt or disposed of prior to the completion and submission of a waste assessment as specified in section 4.2, the licensee must notify the District Manager. Where a fire or other event has destroyed timber that is required to be included in a waste assessment, the District Manager may require district averages that are published on the Timber Pricing Branch website to be used in the waste assessment. The District Manager may determine higher waste volumes using other information if district averages do not provide a reasonable assessment.

4.3.2 Waste Assessment Areas Using District Averages

The following waste assessment areas may not require field sampling:

1. Forestry Licence to Cut with a volume limit of 2,000 m³ or less, **written in the licence agreement.**
2. Occupant Licence to Cut with a volume limit of 2,000 m³ or less, **written in the licence agreement.**
3. Forestry License to Cut issued under 47.6(3) of the Act in conjunction with an activity funded out of the BCTS account.
4. A scale based right of way accessing a cruise based cutblock.
5. A **cutblock within a** blanket salvage cutting authority **(under the Interior Appraisal Manual section 6.4.2).**
6. **A cutblock smaller than 2.0 ha. This paragraph does not apply to partial cutblocks or patch cut cutblocks.**

Where this method is used, a letter must be attached to the waste system submission that describes which criterion applies.

The waste volume **for the waste assessment areas described in this section** will normally be billed using district average waste volumes and grades published on the Timber Pricing Branch website. Species percentage is determined using Mark Monthly Billing History Selection Report in HBS.

This section does not apply to tenures in which an excessive volume of timber has been left on site **or where all timber has been cut and left on the cutting authority area. (E.g. glading or “felled and bucked” timber.)** The District Manager may determine higher waste volumes using other information if district averages do not provide a reasonable assessment. The District Manager or Regional Manager may direct the licensee to complete a full waste survey involving field sampling

according to other sections of this manual.

5.4 Sampling Designs Within Single Waste Assessment Area and Aggregate Populations

5.4.1 Simple Random Sampling

Simple random sampling uses only measure plots. Within the waste assessment area, a predetermined number of sample plots are established, measured, and averaged to determine an estimate of volume for the population.

5.4.2 Ratio Adjustment Sampling

In ratio adjustment sampling, a predetermined number of prediction plots are established, and a random selection of these plots are measured. **After a prediction is entered into EForWasteBC, the software randomly determines whether the plot will require measurements. This system can increase sampling efficiency, while maintaining a low sampling error.**

In a prediction plot, the surveyor must predict (estimate) the total volume (m³) of merchantable timber **(total of Grade 1, 2, and 4 only)** within all dispersed or accumulation strata plots in the field at each plot location.

In this method:

1. Ratio adjustment sampling is implemented at the plot level,
2. A ratio between the measured plot volumes and predicted plot volumes is calculated. This ratio adjustment is applied to the average volume per hectare from all prediction plots in the stratum, and
3. The ratio-adjusted volumes per hectare are used to determine an estimated volume for the population, and
4. Volumes for each stratum are added to determine the total waste assessment area volume.

6.2 Sample Plan Composition

6.2.1 Waste Assessment Area

A waste sample plan is composed of waste assessment areas. **The estimated net waste areas and stratum areas used in the sample plan must be determined with care and due diligence. There can only be justifiable differences between the estimated and the final submission areas.**

A waste assessment area can be a complete cutblock or the harvested portion of a cutblock.

Harvested portions of cutblocks may be submitted and sampled as separate waste assessment areas for each year of harvest when the harvest of a cutblock has occurred over multiple years.

Cutblocks containing both helicopter and conventional harvest methods must be separated into two waste assessment areas and sampled separately.

6.3 Population Structure

6.3.1 Aggregate Populations

An aggregate sample plan and population must meet the following requirements:

- 1) It is comprised of at least two waste assessment areas.
- 2) It has a net population size of less than 3,000 ha.
- 3) It is fully contained within:
 - i) a single Natural Resource Region for Woodlots and Community Forest Agreements with a sharing agreement.
 - ii) a single Natural Resource District for all other tenures.
- 4) Primary logging must be complete for all waste assessment areas in the population at the time of initial sample plan submission.
- 5) Helicopter-harvested areas cannot be combined with areas harvested by other methods.
- 6) BCTS waste assessment areas may be combined only with other waste assessment areas within the same Timber Sale Licence. BCTS waste assessment areas cannot be combined with non-BCTS waste assessment areas.
- 7) A population may be comprised of two or more licensees (client codes) if a written sharing agreement has been made between the licensees. The sharing agreement must bind each licensee to accept the aggregate survey results. Each licensee will need a separate RU for reporting purposes in the Waste System. The sharing agreement must be submitted in the Waste System in each reporting unit.
- 8) Woodlot Licences and Community Forest Agreements may establish sharing agreements between each other as described in (7) above. However, Woodlot Licences and Community Forest Agreements cannot be combined in an aggregate with any other tenures.
- 9) **Cutblocks requiring utilization of Grade 6 cannot be combined with cutblocks where Grade 6 utilization is not required.**

6.4 Stratification

Stratification can increase the precision of population volume estimates and reduce the amount of sampling required to achieve a desired level of precision. Therefore, it is useful to stratify subpopulations where possible and practical.

In waste assessments, stratification should be limited to significant differences in the relative quantity of waste. Unique strata must be easily and consistently identifiable and must be estimated in the same manner throughout the population. All stratification decisions must occur prior to field sampling and be identified on the waste assessment area survey map.

All strata within a waste assessment area must be correctly reported in the survey submission.

Each stratum must be assigned one of the three subpopulation types listed below and requires the minimum number of samples required for that stratum type. Each subpopulation must be sampled independently of other subpopulation areas.

Any stratification of waste types must be supported with field notes and a map, and must be consistently applied within each waste assessment area of the population.

Stratification of non-sampled waste assessment areas in aggregate populations is not required. HRC applies the stratum distribution present in the sampled waste assessment areas to the non-sampled waste assessment areas.

6.4.1 Subpopulations

Three subpopulations exist: accumulated, dispersed, and standing waste (trees). Each subpopulation may be subdivided into one or more strata.

Each subpopulation is a unique area, which cannot overlap another subpopulation. Likewise, one stratum cannot overlap another stratum. Accordingly, subpopulations and strata are always sampled independently of each other.

As described in 6.4.1.3.2, single or scattered trees may be included as part of the dispersed subpopulation.

6.4.1.1 Dispersed

Dispersed waste occurs on the areas from which trees have been cut and forwarded away from the stump. The majority of area in a waste survey will be in this stratum.

6.4.1.2 Accumulations

Accumulated waste occurs at receiving areas, such as landings or roadsides where trees have been forwarded and manufactured into logs. Accumulated strata can include spot accumulations,

roadside accumulations, windrows, and cold decks. Spot accumulations can also occur in the dispersed area where waste and debris has been gathered into piles.

Accumulated strata are differentiated from dispersed strata by different waste levels resulting from the deposition and processing of forwarded trees at a concentrated area.

Accumulation strata must not be confused with areas of high waste volume in the dispersed stratum.

There are various acceptable methods for stratification and sampling accumulations, which are described in section 8.5. Depending on the method used, these piles may be included as part of the dispersed subpopulation or the accumulation subpopulation.

6.4.1.3 Standing Waste

Standing waste consists of either patches, single, or scattered trees that are appraised for harvest, but are not cut. The surveyor must ensure that a standing waste stratum, where it constitutes its own subpopulation, is assigned the correct area in hectares, which is separate from the area in hectares of the dispersed subpopulation.

6.4.1.3.1 Standing Waste in Patches

Standing tree patches are areas of unharvested timber occupying an area of equal to or greater than 0.05 hectare. These patches must be stratified separately from the dispersed and accumulation strata and the volumes are determined with methods described in section 9.5.2. **Only one standing waste stratum code for standing waste in patches may be used in a population.**

6.4.1.3.2 Standing Waste Occurring as Individual Standing Trees

The method used to stratify **individual standing** tree waste must be consistent throughout a population. These trees may be stratified using one of two methods.

- 1) 100% scale or percent estimate.
- 2) Measurement within the dispersed plots.

Only one standing waste stratum code for individual standing trees may be used in a population.

6.5 Sample Size and Number of Plots

The selection of non-sampled waste assessment areas (for aggregates) and the required number of plots is based on the population or size.

To determine the number of plots within a sample plan:

1. For single waste assessment area populations, use Appendix 4
2. For aggregate populations, HRC auto-populates the number of plots in the sample plan using Appendix 4.

Non-sampled waste assessment areas are not used to determine the required number of plots.

6.5.1 Non-Sampled Waste Assessment Areas in an Aggregate

An aggregate population with a net size greater than 200 ha may not require all waste assessment areas to be sampled. A random process is used to select non-sampled waste assessment areas using the following formula:

The approximate area to be surveyed is:

$$200 + ((H - 200) * 0.33)$$

Where H is the total population size in hectares.

Non-sampled waste assessment areas will have waste assessments calculated as an average of the compiled waste **volumes** from all sampled waste assessment areas within the population.

6.7 Implementation

6.7.1 Single Waste Assessment Area Sample Plans

1. Identify the sample population,
2. Select a sampling design,
3. Determine the sample size, including:
 - a. The number of plots in dispersed strata
 - b. The number of accumulation samples,
4. Prepare the waste assessment area survey map,
5. The waste assessment area survey map is signed by a Forest Professional, and
6. Submit the waste assessment area survey map.

6.7.2 Aggregate Sample Plans

1. Identify the sample population,
2. For populations larger than 200 ha, submit the list of waste assessment areas and required details to Timber Pricing Branch using the required template. This step is optional. If a randomizer request is not submitted, all waste assessment areas in the population must be included in the sampling plan.
3. Timber Pricing Branch will select the non-sampled waste assessment areas using a randomizer application. The selection list will be sent back to the submitter with a copy to the District and Area.
4. Select a sampling design (SRS or ratio),
5. Using the Aggregate Sample Plan in HRC, enter **all** waste assessment areas **in the population and identify which are** selected **by Timber Pricing Branch** for sampling:
 - a. Number of plots in dispersed strata,
 - b. Number of plots in other strata as required,
 - c. The plots are distributed with a consistent plot intensity within the population and are allocated using a random starting point,
 - d. The exact plot numbers assigned in the Aggregate Sample Plan Report in each waste assessment area and stratum combination must be used to label the plots on the survey map and to record the plots in EForwasteBC,
 - e. Some small waste assessment areas selected for sampling may not be assigned any plots in the Aggregate Sample Plan. These will be treated as non-sampled waste assessment areas and do not require stratification or fieldwork.
6. The sample plan is endorsed by a Forest Professional,

7.1 Principles

The determination of the area to be surveyed is an important component in obtaining the correct waste volume per hectare, the waste assessment area volume, and waste billing.

The waste survey planner must develop waste assessment area survey maps and conduct area calculations to determine accurate areas for waste reporting.

A cutblock can contain areas of reserved timber, non-productive areas (roads), merchantable timber areas (standing timber), and areas outside of the appraised cutblock boundaries (i.e. external landings) that contain waste from the waste assessment area to be sampled.

The area used to calculate waste volumes is the **sum of the cutting authority area and associated areas that could reasonably be expected to contain waste material from the waste assessment area (i.e. stumps, logs, bucking waste, cold decks or standing timber).**

When any changes to harvest or reserve areas have occurred:

1. The correct areas must be used in the sample plan. These areas must align with the areas stated in the post harvest certification document **<text deleted>**,
2. Prior to completing any field work, updated maps (with maps and tables attached for standing timber as described in the Waste and Residue Post Harvest Certification) must be given to the waste surveyor, and
3. The correct areas must be **entered in EForWasteBC, compiled in HRC**, and uploaded into the Waste System by a forest professional.

7.2 Net Waste Area Calculation

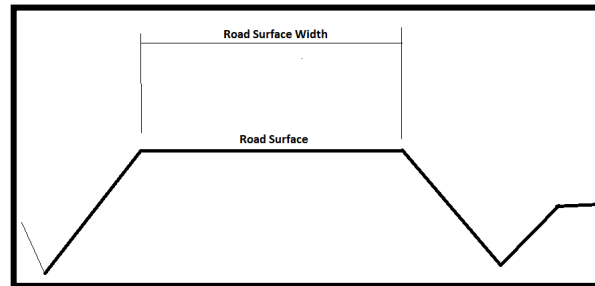
1. The net waste area of a waste assessment area is calculated as follows:
 - a. Find the gross harvest area
 - i. In the Electronic Commerce Appraisal System (ECAS) for fully appraised cutting authorities, or
 - ii. In cutting authority documents or GPS'd or traversed areas for non-appraised cutting authorities).
 - b. Subtract the area of any reserves or retention from the waste assessment area. See Section 9.5.2 for treatment of reserved timber and standing waste.
 - c. Add the area of associated road permits.
 - d. Add any areas associated with the cutblock where forwarding, decking, processing, or cutting of merchantable timber have occurred (i.e. pre-existing right of way, off site landings, etc.)
2. Subtract the area of non-productive areas (i.e. bare road running surface). Road surface areas that contain waste (i.e. piles or windrows) must be included. NP areas that do not contain any waste material are removed from the waste assessment area and are not sampled.

To calculate the NP area of roads for waste area calculations, the road surface area is the same as the road running surface area (as shown in Figure 1 below); it does not include ditches and fill slopes.

To determine the road NP area:

- a. Measure the road width (running track of the road) at various locations within the waste assessment area and calculate the average.
- b. Determine the length in metres of the constructed roads.
- c. Multiply the road length by the width to determine the net road surface area.
- d. Enter the NP area into the Waste System on the Waste102 page under Roads (NP/NF).

Figure 1 Diagram of Road Prism

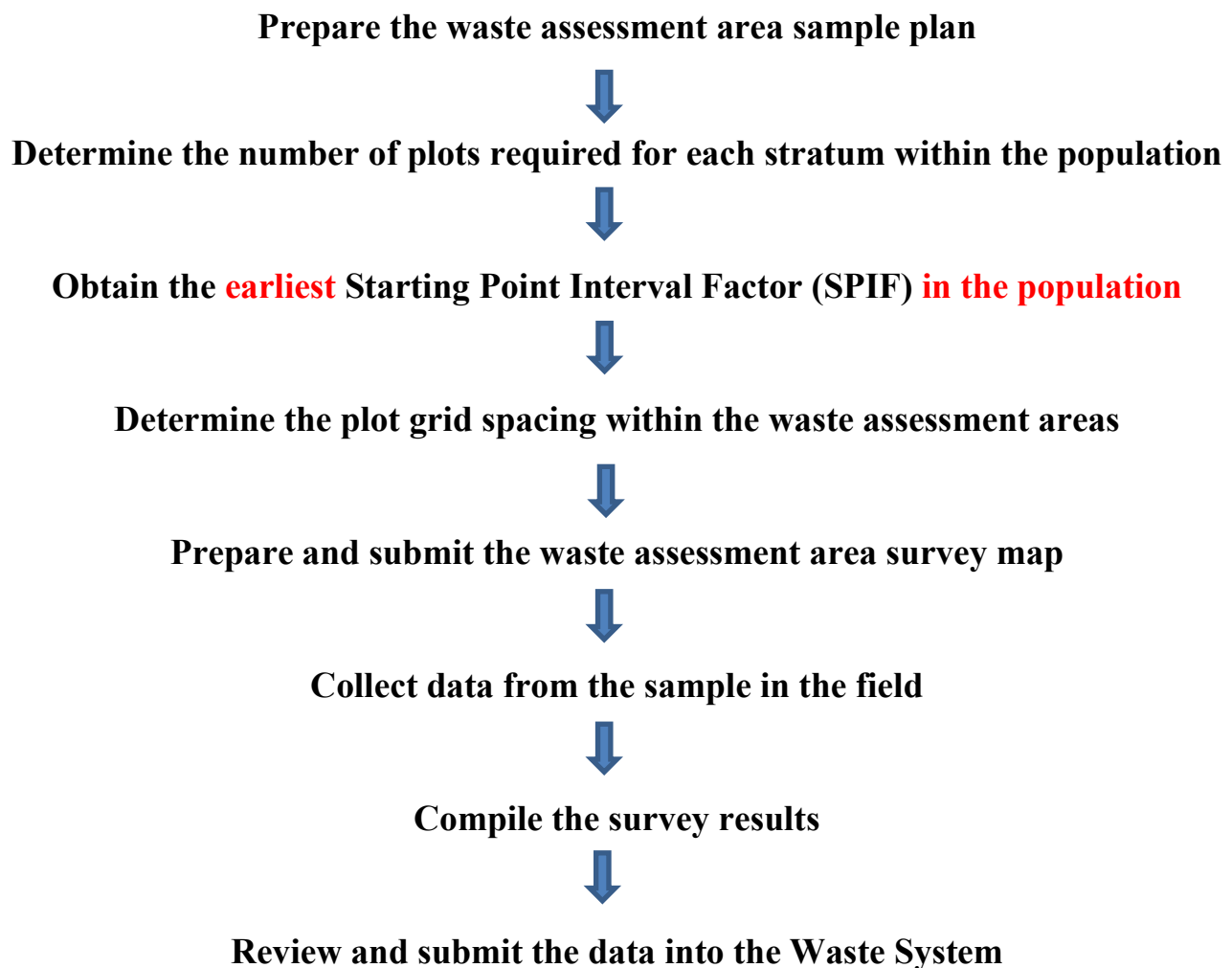


3. The net waste area reported into the Waste System does not need to and usually will not reconcile with the cutblock net area in other reporting systems i.e. RESULTS, FTA etc.
4. Partial cut, machine free, riparian management zones etc. within the boundaries of the waste assessment area are assessed for waste material.
5. The combined sum of all sub-strata areas within a waste assessment area must equal the net waste area.

Refer to Appendix 6 for an example of a net waste area calculation.

8.1 The Plot Sampling Process

The planning and implementation of plot sampling surveys involves either a single waste assessment area or a group of waste assessment areas within an aggregate. The following steps are required to complete a waste assessment.



8.4 Dispersed Strata Plot Layout

8.4.1 Plot Spacing (Grid Size)

Once the number of plots within each waste assessment area or aggregate population has been determined, the **dispersed stratum** inter-plot spacing (grid spacing) must be determined. The grid spacing is calculated **using the formula**:

$$\sqrt{(10,000 * (\text{dispersed stratum area (ha)} - \text{external right of way}) / \# \text{ of plots})}.$$

The grid spacing calculation will generate a result to within one metre or less. This value should be used if the survey plan is generated using GIS software. If the survey plan will be produced by hand, the calculated grid spacing value must be rounded to the nearest 5 metre value (the smallest measurable measurement at 1: 5,000 scale).

If necessary when drawing the waste survey plan, after the grid spacing value is calculated, the grid spacing can be reduced or increased to generate the required number of plots within the waste assessment area.

Example: 30 plots required in a 122.0 ha waste assessment area will generate a GSD of 201.7m (202m)

- For survey plans drawn using GIS, use a 202m GSD
- For survey plans drawn by hand, use a 200m GSD
 - If the 200m GSD generates less than 29 plots, reduce the GSD to 190m
 - If the 200m GSD generates more than 31 plots, increase the GSD to 210m

Appendix 5 contains an example of a Grid Spacing Worksheet.

8.4.2 Plot Location

The steps required to locate dispersed plots on the waste assessment area survey map are as follows:

1. Compute the grid spacing distance (GSD) using the grid spacing worksheet or the procedure described in section 8.4.1.
2. Establish a local grid on the waste assessment area using the following procedure:
 - a. Project a line due south from the most western point of the net merchantable area, and
 - b. Project a second line due west from the most southern point of the net merchantable area for the cutblock. This line is the baseline.
3. Obtain the Starting Point Interval Factor (SPIF) from the Timber Pricing Branch website for the PLC month **<text deleted>**. The SPIF multiplied by the GSD will determine the horizontal distance from the point of intersection of the local grid to the initial strip (IS)

location.

- a. For aggregate populations use the earliest PLC in the sample plan to obtain the SPIF for calculating each cutblock's initial strip (IS) location. (The earliest PLC in the aggregate is applied to all cutblocks in the population.)
 4. Starting at the point of intersection of the local grid, locate the IS at the SPIF distance. The IS must be oriented North/South.
 5. Locate all remaining strips at the full GSD along the baseline from the IS and orient them North/South.
 6. Number the strips:
 - a. Sequentially from West to East.
 - b. All strips that fall within the harvested area must be numbered.
 7. Locating the plots:
 - a. All plot locations that fall within the harvested area must be mapped.
 - b. On odd numbered strips, locate the first plot at one half the GSD along the strip from the baseline. Locate the remaining plots at full GSD along the strip.
 - c. 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.
- Occasionally the number of located plots on the map will not match the intended number of plots. This can be caused by two situations:
- i. The sample grid was not completed correctly (incorrect GSD, missed plot location, etc.), or
 - ii. The configuration of the cutblock results in a reduced or increased number of sample points.
8. Adjust the GSD when:
 - a. In a single waste assessment area, the number of plots is greater than plus or minus 1 plot from the intended number, or
 - b. In aggregate populations, the located number of plots does not match the intended number from the sample plan.

For survey plans drawn by hand, the grid is reduced or increased in 10 metre increments.

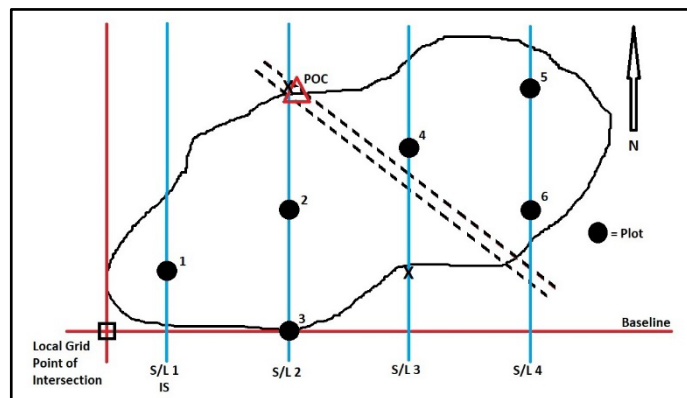
For survey plans drawn using GIS, use the first grid spacing that will result in the required number of plots.

9. Number the plots. Each plot in the dispersed stratum must have a unique number identified on the survey plan map.
 - a. Starting from strip 1, number the plots sequentially from north to south along each strip.

Figure 2 provides an example of the dispersed plot design.

Figure 2 Example Strip and Plot Placement Using a 50% SPIF

Figure 2 E



8.4.3 Plot Allocation

When, after adjusting the GSD, the required number of plots cannot be located on the survey map:

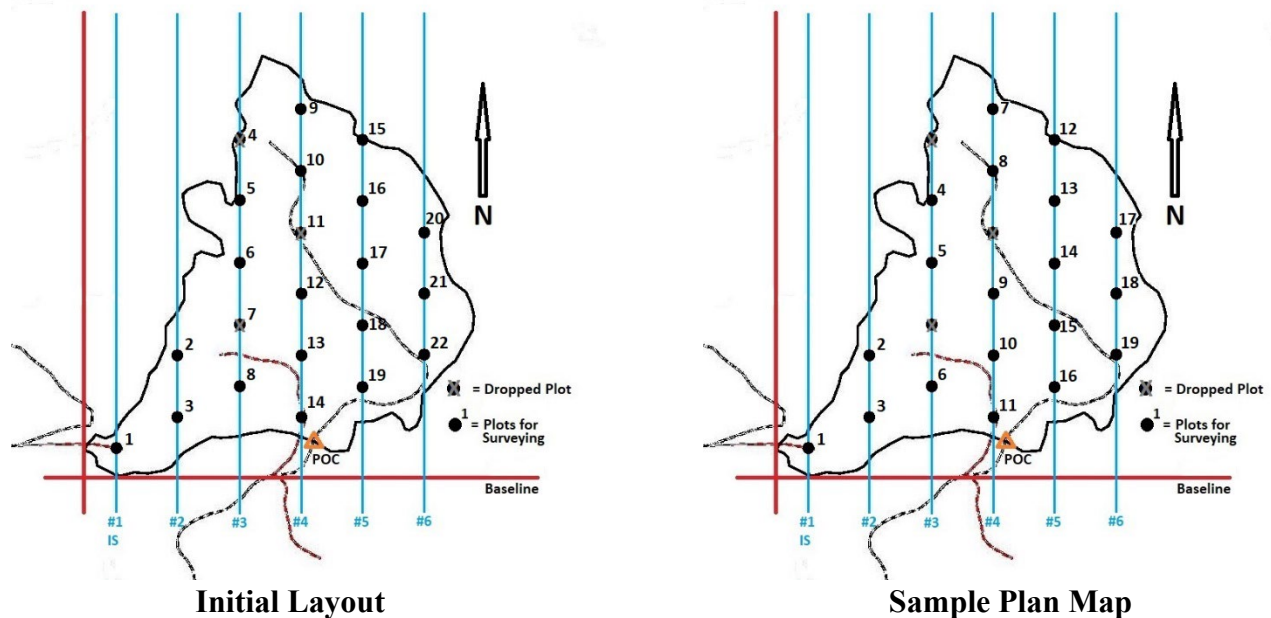
1. Adjust the GSD interval in ten (10) metre increments until the number of plots is greater than the number of plots required, and
2. Apply the following rules in order to reduce the number of plots until the desired number of plots is achieved.
 - a. The first dropped plot will be determined by multiplying the total number of plots in the waste assessment area by the SPIF for the PLC month of the waste assessment area **in a single block population or the earliest PLC month in an aggregate population.**
 - b. The second dropped plot will be determined by multiplying the total number of plots in the waste assessment area (prior to dropping any plots) by the previous month's SPIF.
 - c. Continue using step b to determine further dropped plots until the desired number of plots is achieved.
 - d. For each step, use the rounding rules as described in section 9.4.3.(1)(a).
 - e. Renumber the remaining plots using the procedure in section 8.4.2.

Example:

Waste assessment area with 22 plots on the map, and 19 plots are required. The **earliest PLC date in the aggregate sample plan** is October 20, 2020.

1. First dropped plot = 22 plots * October 2020 SPIF 50% = plot 11
2. Second dropped plot = 22 plots * September 2020 SPIF 30% = plot 7
3. Third dropped plot = 22 plots * August 2020 SPIF 20% = plot 4

Figure 3 Example of Aggregate Plot Allocation Process



The numbering and selection of roadside sample piles utilizes the right-hand rule and must be completed using the one-sided method:

1. Starting at the POC (where the road enters the waste assessment area), number piles sequentially on the right-hand side of all roads.
2. Always stay to the right-hand side of the road in the direction of travel when numbering the piles. When coming to a branch or 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.

For piles that are stratified out under section 8.5.2(2) within the dispersed stratum, all piles must be identified and numbered sequentially throughout the waste assessment area.

In aggregate populations:

1. Pile numbering must restart at one (1) in each waste assessment area in the population, and
2. The pile plot numbers assigned must be established within the corresponding cutblocks exactly as they appear on the Aggregate Sample Plan.

8.5.4 Sampling Method and Procedures

For waste assessment areas that use simple random sampling (single waste assessment area SRS, or aggregate SRS sampling designs):

1. Count all piles and label them using the procedure outlined above,
2. Determine the number of sample **piles** required,
3. Identify the sample piles to be measured, and
4. Measure the required pile attributes for **all sample piles**.

For waste assessment areas that use ratio adjustment sampling (single waste assessment area ratio or aggregate ratio):

1. Count all piles and label them using the procedure outlined above,
2. Determine the number of sample **piles** required,
3. **Identify the sample piles to be measured,**
4. **At each sample pile, complete the volume prediction (quick estimate of volumes without taking measurements),**
5. **When a prediction is confirmed in EForWasteBC, the program will determine by a random process if the sample pile must be measured, and**
6. Measure the required pile attributes for the randomly selected samples.

In aggregate populations, the procedures listed above only apply to the waste assessment areas that are selected to be sampled.

For aggregate populations, the number of piles may be estimated or counted when completing the sample plan for the population. To estimate the number of piles, the Aggregate Sample Plan will

multiply the waste assessment area's net area by a factor of 1 pile per 0.9 hectare to obtain the estimate.

8.5.4.1 Sample Selection Process

1. Calculate the sample pile interval:

- a. Divide the number of piles by the planned number of samples.
- b. Round the result to the nearest **non-zero** whole number.

Note: This will occasionally result in more samples than intended.

- i. In a single waste assessment area, establish the extra plot.
- ii. In an aggregate, only establish the required number of plots as specified on the Aggregate Sample Plan.

2. To select the piles to be sampled:

- a. Use the date that the first plot is established on the block (in any stratum) for each waste assessment area in the population. (E.g. Use "15" if surveyors established the first plot on the waste assessment area on June 15th.)
- b. The first sample pile is the pile with the same number as the survey date.
- c. Where the date is greater than the number of piles, use the last digit of the date.
- d. If the last digit of the date is greater than the number of piles, use the first number of the date.
- e. If this number is still greater than the number of piles, select the first pile as the first plot.

Example 1:

- 36 piles requiring 15 samples, surveyed on the 23rd of the month
- $36 \text{ piles} / 15 \text{ samples} = 2.40$; survey every 2nd pile
- Select the following piles: 23, 25, 27, 29, 31, 33, 35, 1, 3, 5, 7, 9, 11, 13, 15

Example 2:

- 25 piles requiring 13 samples, surveyed on the 30th
- $25 \text{ piles} / 13 \text{ samples} = 1.92$; survey every 2nd pile
- Select the following piles: 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 2

8.5.4.2 Plot Location Procedure

In spot accumulation strata, the plot is placed on the front for even numbered sample plots, and on the back for odd numbered sample plots. If it is not safe to work around the correct plot location, 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.

The plot size and shape to be used for pile plots is 50 m². When a rectangular (or other shape as necessitated by the shape of the pile) is used, the plot edges must be painted and clearly marked in the field using stakes or ribbon.

8.6 External Road Right of Way and Roadside Strata Plot Layout

8.6.1 Road Right of Way External to a Cutblock

Road rights of way containing merchantable timber must be reported in the Waste System.

8.6.1.1 Procedures

There are three options to account for external road right of way:

1. No plot sampling is required
 - a. Include the area of the road right of way area with the dispersed subpopulation area of the waste assessment area, or
2. Sample with plots (50 m²) in a separate roadside stratum
 - a. Use the stratum code of OT0X, or
3. When a scale based road permit accesses a cruise based cutting authority:
 - a. Sample with plots (50 m²), or
 - b. Use the right of way survey information from another surveyed road permit area containing similar species composition and waste levels, or
 - c. Use the procedures in section 4.3.2 for determining waste.

8.6.1.2 Plot Location Procedure

Right of way sampling is completed using rectangular 50 m² plots. Starting from the POC (where the road enters the waste assessment area), locate the plots covering the width of the area between the edge of the road and the edge of the timber using the right-hand rule.

1. Determine the GSD between the plots. This is calculated by dividing the right of way length by the number of plots that are required.
2. **Multiply the SPIF by the GSD to calculate the first plot location. For aggregate populations use the SPIF for the earliest PLC date in the sample plan.**

To establish plots, follow the procedures below for roadside plot establishment.

8.6.2.1 Plot Layout

1. Start from the POC and follow the right-hand rule.
2. Using the SPIF, establish the first plot at the GSD times the SPIF. **For aggregate populations, use the SPIF for the earliest PLC date in the sample plan.**
3. For one-sided or a mixture of one and two-sided strata, locate a 50 m² plot on the right side of the road. For two-sided strata, locate a 50 m² plot on each side of the road.
4. If the stratum is sectioned along the road, stop measuring distance at the end of each strata section and resume measuring at the beginning of the next strata section until each GSD is located.
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 strata 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.
7. Number the plots starting from the POC using the right-hand rule.
8. Roadside strata must be marked on the waste survey map so the layout can be audited.

8.6.2.2 Establishing Plots

Plots located within a roadside stratum must be located in an unbiased and random manner. Plots must be located in such a way that all areas of the stratum are available for and have an equal probability of sampling.

In the field, plot centers are located alternately at 4 m for even numbered plots and 11 m for odd numbered plots from the road surface edge when a 15 metre wide roadside stratum is used. Either circular or rectangular plots are acceptable in these circumstances. If a different stratum width is used, the surveyor must ensure the plots cover the entire stratum width and may use a rectangular 50 m² plot where needed.

8.6.2.3 Variable or Fixed Roadside Strata Greater than 15 Metres Wide

For fixed width roadside strata that are over 15 m wide, 50 m² rectangular plots must be used. Each plot must cover half the width of the stratum by the distance required to make the plot size. The plots will be staggered with the odd number plots covering the outside half of the stratum and the even number of plots covering the inside half (i.e. for a 20 m wide stratum each plot would be 10 m wide by 5 m long).

For varying width strata, map the width of the stratum every 25 m along the road. Rectangular plots (which cover the entire width of the stratum where the plot is located) must be used.

8.9 Debuilt Road

If a road has been debuilt, logs and stumps have been pulled back from the side-slopes and scattered over the top of the deactivated road. A debuilt road may be surveyed with the dispersed stratum or as a unique stratum.

8.9.1 Sample with the Dispersed Stratum

A debuilt road can be surveyed as part of the dispersed subpopulation. Any plots located on the debuilt portion are sampled where they are located using a circular plot. All pieces that fall within the plot will be measured and recorded.

Note: The road surface area for debuilt roads is added back into the net waste area of the waste assessment area.

8.9.2 Sample as a Unique Stratum

A debuilt road can be stratified from the dispersed subpopulation and surveyed as a unique stratum. The stratum code for debuilt roads is WB0X.

1. The minimum number of plots for an other accumulation stratum type must be established.
2. The stratum area is determined by the road surface width and length.
3. Locate 50 m² rectangular plots on the debuilt portion.
4. Plot dimensions will be 50 m² divided by the road width
 - a. Determine the GSD between the plots (stratum length/number of plots).
 - b. Apply the SPIF to the GSD to calculate the first plot location. For aggregate populations, use the earliest PLC date in the sample plan to determine the SPIF.
 - c. Starting at the POC, proceed down the road the calculated distance to the first plot. This point (C1) establishes the center point of the first plot.
 - d. From C1 locate a 50 m² plot on the debuilt road area.
 - e. Establish the next plot by measuring the full GSD from C1 down the debuilt road to C1 of the next plot.

Example:

- Stratum area:
 - Road surface: 400 m, road width: 5 m
 - 400 m length * 5 m width = 2000 m² or 0.20 ha
- Plot dimensions:
 - 50 m² plot size / 5 m width = 10 m,
 - Establish a 5 metre by 10 metre plot.

8.10 Cold Decks

Log decks that remain on a waste assessment area and are to be removed and scaled at a scale site, or are field scaled, are not to be included in a waste assessment as the scale data will be reported in HBS. These decks must be clearly marked by the licensee.

All cold decks within a receiving area such as a roadside or landing must be stratified into an accumulation stratum and measured using the procedures in section 9.5.8.

Cold decks within the area where timber has been forwarded away from the stump may be surveyed in one of two different ways – as part of the dispersed stratum or as a unique deck accumulation stratum.

1. Surveyed as part of the dispersed stratum. Under this method:
 - a. Dispersed plots established in the field will include all dispersed cold decks or portions thereof within the plot,
 - b. All pieces that fall within the 200 m² dispersed plot will be measured and recorded, and
 - c. Plots cannot be moved or altered to exclude decks or portions of decks contained within the plot boundary.
2. Surveyed as a deck accumulation stratum. Under this method:
 - a. All decks within the dispersed stratum must be stratified separately from the dispersed, roadside, or landing strata,
 - b. All decks must be identified and sampled throughout the **population**,
 - c. The areas of the decks in both the accumulation and dispersed strata must be noted on the final map and the deck areas removed from their respective strata areas,
 - d. Dispersed sample plot centers must be offset away from all decks, and
 - e. Dispersed plots may be moved as per section 9.2.6 as required to avoid overlapping a deck stratum; however, must retain a 200 m² size.

The survey methodology for cold decks must be consistent within an entire aggregate population. Similar cold deck strata within multiple waste assessment areas in an aggregate population must be combined into a single cold deck stratum code.

9.2.2 Locating Dispersed Plots Using Conventional Methods

To locate dispersed plots using conventional (hand survey) methods, determine the distance and bearing from a tie point on the survey plan map to a sample point. Using field traverse procedures, travel the required distance and bearing from the tie point to the plot location as indicated on the waste plan. When the required distance has been measured, a stake, pin or equally effective center point marker must be established at the plot center.

Tie points must be linked to the survey grid with a hand traverse that meets the standards in Chapter 9. All distances are to be corrected for slope and must be measured to the standards listed in this manual.

9.2.3 Establishing Dispersed Plots Using GPS Technology

Dispersed plots may be located with the use of GPS technology provided the following procedures are followed:

1. The survey plan map has been created using GIS software,
2. The plot location coordinates are generated through GIS software,
3. The plot locations are identified from ‘system derived’ X, Y coordinates with the coordinate in an attribute table,
4. The coordinate system used must be specified as either UTM or BC Albers,
5. Coordinates must be labeled to the plot number,
6. Plot coordinates must be transferred to the GPS unit via digital file, and
7. Plot coordinate and shape files must be provided to the Ministry upon request.

Procedures for establishing waste plots using GPS are described in detail in Appendix 11.

Georeferenced maps cannot be used for traversing to or establishing a waste plot location. An iPad, tablet, or cellular device cannot be used to create the final waste assessment area survey map.

9.2.4 Plot Establishment and Marking

All POCs and tie points must be clearly marked with aluminum tags or flagging ribbon and high-visibility paint and be easily observed from access roads. All plots must be **established in EForWasteBC at the time of plot establishment in the field. (A plot prediction volume or other plot data must not be entered in EForWasteBC before arriving or after leaving the physical plot location.)**

All tie points and plot centers, including prediction plot locations, are to be established with a sturdy stake driven well into the ground and made clearly visible with paint or surveyors flagging ribbon and labeled using a waterproof felt pen or other method (i.e. aluminum tags) that clearly identifies the plot number.

9.3.3.2 Examples of Avoidable Waste

1. Stub trees that have not been identified in the cutting authority and appraisal or the retained volume was not accounted for in the appraisal of the cutting authority.
2. Chunks on a skidding trail used to support the machinery that resulted in the breakage of pieces greater than the minimum log length. Such pieces are classified as avoidable and are graded according to the characteristics of the whole original piece.
3. Helicopter bucking waste. Incorrect estimation of log weights may result in having to buck the logs shorter after attempting to lift them. Such waste is always regarded as avoidable.
4. Pieces bucked from a log to ‘zero’ the processor.
5. Bucking waste cut from a log to remove a defect that extends beyond the effect of the defect.

9.3.4 Piece Estimates

Waste pieces are often partially obstructed by branches, soil and other loose debris. The correct measurement of waste pieces is dependent on the ability of the surveyor to view a piece and confidently measure dimensions and observe defects affecting volume and grade. Surveyors are expected to attempt to clear loose debris to facilitate measurement and classification of pieces.

A reasonable effort must be made to measure as much as possible. **If one end of a piece is accessible, the piece must be considered. If enough attributes are visible to reasonably determine species, grade, kind, class, and size, the piece must be tallied.**

< deleted text >

9.3.5 Measure Factor

In strata where piling or deep accumulations exist, pieces in a plot may be unsafe to measure, obstructed, or inaccessible, therefore it may not be possible to measure or estimate each piece within a plot. Only in these cases, a measure factor can be applied to the plot. The measure factor adjusts the plot volume to account for pieces that were not measured or estimated by the surveyor within the plot.

In these cases:

1. Measure and/or estimate the waste material that is accessible. Measure as many pieces as possible, even when some dimensions of an individual piece must be estimated. **All accessible pieces must be assessed. Failure to tally all accessible pieces will result in rejection of the survey. Only pieces that cannot be reasonably assessed can be included in the measure factor.**
2. **Plot placement on a pile must not be intentionally biased to impact plot volume.**
3. Project the plot boundaries down to the ground and estimate what percentage of the volumes within the plot boundaries were measured. This is the measure factor for the plot.

9.4 Measurement Protocol and Standards

9.4.1 Measurement and Recording Standards

Waste material, logs, and trees are measured for volume and graded using the principles and procedures identified in the Ministry of Forests, Lands, Natural Resource Operations and Rural Development *Scaling Manual* except where otherwise described in this manual. Waste stumps and bucking waste are graded using the principles and procedures identified in this manual.

Record gross length measurements to the nearest one-tenth (0.1) of a metre and gross diameter measurements in radius class units (rads, 1 rad = 2 cm). Record deductions in length to the nearest one-tenth (0.1) of a metre and deductions in radius to the nearest rad.

Record the gross dimensions of each piece including rot or other defects. In addition, the waste surveyor calculates the volume deductions for any defects or missing wood and records the deduction equivalent under "Deduction for Rot/Holes" in rads and/or in metres as a length deduction, along with the most appropriate "decay type."

When netting down the dimensions of a log because of defect or missing wood, the gross length will be used to determine if the piece meets the 3.0 m minimum log length. Therefore, the net length of a log used for volume calculations can be less than 3 m. Both the gross length and deductions are always recorded.

Top measurements on logs which have very little taper must be made carefully due to the length of merchantable wood involved between radius classes.

1. For oversized tops, the top measurement is made at the last occurrence (i.e. at the uppermost point on the tree) of the applicable timber merchantability top dimension specification.
2. When using a scale stick, for a 10 cm top, it will be the midpoint of the 5 radius class. For a 15 cm top, it will be the line separating the 7 and the 8 radius class.

Recording the measurements of the portion of borderline pieces that are outside the plot is optional. The minimum requirement will be the measurements of the portions of the pieces within the plot, together with a code (when needed) that will override computer checks on minimum log length.

Measurement of Grade 6 is required when specified in the cutting authority document. **Do not tally Grade 6 unless utilization is mandatory.** Measurement of Grade code Z logs is not required. **Do not tally Grade Z.**

9.4.2 Minimum Measurement Requirements

The minimum length requirement for measurement is 0.1 of a metre (10 cm). Pieces less than 0.10 of a metre (10 cm) at the midpoint of the diameter are not recorded.

All dead pieces greater than 50% sound that meet or exceed the TMS must be measured.

9.7.3 Partial Cutblock Waste Assessment Areas

A partial cutblock waste assessment area is required when a cutblock has not been fully harvested and harvesting has stopped for an extended period. A partial cutblock waste assessment area allows waste to be surveyed in a timely manner, despite a delay in harvest completion.

Eventually, when harvest of the remaining portion of the cutblock is done, the remaining partial cutblock must be surveyed and submitted in a separate sampling population. Both partial cutblock waste assessment areas have their own PLC dates.

A partial cutblock waste assessment area must not be used if harvesting will re-commence before the waste survey on the first portion of the cutblock is complete and an interim submission has been received by the district. If harvesting will re-commence before the waste survey can be completed, the cutblock is not PLC, and it cannot be waste surveyed until it is PLC.

Where a partial cutblock will be submitted in a waste assessment, the surveyed portion must be clearly **identified** in the field **using flagging ribbon** and on the waste survey plan map.

No area can be added or removed from a partial cutblock waste assessment area after submission of the sample plan.

A partial cutblock submission cannot be only one stratum.

10.1 Simplified Waste Survey

10.1.1 Introduction

A simplified waste survey process may be used to report waste on eligible cutblocks. This process does not require field sampling and allows waste assessments to be calculated based on cruise and scale volumes.

Currently, this process is not available for single cutblocks within a multi-cutblock cutting authority. It can only be used where the entire cutting authority is eligible and none of the cutblocks are submitted late.

A worksheet provided by Timber Pricing Branch may be used to determine eligibility and waste assessment volumes.

10.1.2 Eligibility

The primary requirement for eligibility is determined by utilization levels and the volume delivered to a secondary fibre processing facility. The formula is calculated for an entire cutting authority containing one or more cutblocks. If all eligibility requirements are met, the simplified waste survey may be used for all cutblocks in the cutting authority.

If the difference of

Net Cruise Volume – Total Harvest Billing Volume

Is less than the sum of

Benchmark Volume + Volume Delivered to Secondary Fibre Facilities

Where

- Net Cruise Volume = the total net cruise volume for the cutting authority as submitted in ECAS. (**Full volume – Cutting Permit Summary**)
- Total Harvest Billing Volume = the total scaled volume from the cutting authority as invoiced in the Mark Monthly Billing History Selection Report in HBS.
- Benchmark Volume = the benchmark volume (m³/ha) X net merchantable area (ha) of the cutting authority.
- Volume Delivered to Secondary Fibre Facilities = the total scaled volume delivered to a pulp mill, chip plant, pellet plant, or bioenergy plant and processed as one of these products. Deliveries to a secondary fibre facility are not mandatory. A value of zero is used if there are no such deliveries.

Then the remaining waste assessment areas may be eligible for the simplified waste survey subject to further conditions below.

11.3 Waste Submission Review

The Ministry staff will review all data submitted to the Waste System and/or the District and either approve or reject the waste assessment(s).

11.3.1 Office Review Standards

Table 11-4 Office Review Standards

Attribute	Standard
Final sample plan configuration	Completed in accordance with section 6.3
Final aggregate sample plan configuration	No variation of waste assessment areas allowed
Net waste area (strata or waste assessment area)	A survey may be rejected if areas are incorrect.
Multiple mark identification	No variation allowed
Multi mark area	A survey may be rejected if areas are incorrect.
Number of plots	Plus or minus one (1), except in aggregate populations where no variation is allowed
Grid spacing distance	Plus or minus 2.0 %
SPIF	Plots must be located in accordance with the assigned SPIF
Waste survey map	Completed in accordance with section 6.8.1
Site Type	No variation
Benchmark value	No variation

11.3.2 Processing Waste Volume Estimates

Once checking is completed, the Ministry will:

1. Process the submission and forward to HBS for billing or,
2. Advise the licensee if the submission has been rejected.

“**Licensee**” means the holder of a cutting authority;

“**Log**” means any near-round piece with more than half of its original diameter remaining and with an average diameter equal to or larger than the timber merchantability specification diameter for at least 3.0m of length;

“**Manual**” means the Provincial Logging Waste and Measurement Procedures Manual-Interior Version;

“**Merchantable Timber**” means timber that meets or exceeds the timber merchantability specifications that are described in Table 3-1 in this Manual. Timber that is graded 6 or Z (Interior) is not merchantable;

“**Minister**” means the Minister of Forests, Lands, Natural Resource Operations and Rural Development;

“**Ministry**” means the Ministry of Forests, Lands, Natural Resource Operations and Rural Development;

“**Net Waste Area**” means the area of a **waste assessment area** in hectares reported in a waste submission ~~<text deleted>~~;

“**North Area**” means Northeast, Omineca, and Skeena Regions excluding that portion that lies geographically within the North Coast Timber Supply Area;

“**Number of Samples**” means the number of samples of either waste assessment areas or plots in a waste survey;

“**Other related sections**” in the context of the *Forest Act*, means sections 13(3)(b)(ii), 14(1)(d)(ii), 20(3)(b)(ii), 22(f)(ii), 30(f)(ii), 33(5)(b)(ii), 35(1)(c)(ii), 43.3(1)(d)(ii), 43.55(1)(d)(ii), 43.7(2)(e)(ii), 43.8(e)(ii), 45(1)(d)(ii), 47.5(1)(a)(ii), 47.5(2)(b)(ii), 47.7(f)(ii), 118(1)(c)(ii);

“**Partial cutblock**” means a portion of a cutblock that is to be surveyed ~~<text moved to section 9.7.3>~~;

“**PDOP**” means positional (3D) dilution of precision, which is a measure of the precision of GPS results related to the satellite positions. As PDOP decreases, the level of precision increases;

“**Pencil Buck**” means the act of recording bucking waste or stumps as two or more pieces of waste material. Surveyors will divide (pencil buck) the piece of waste at the point where the waste class changes from avoidable to unavoidable waste as a result of a defect in the piece;

“**Pile**” means an accumulation of woody material created by a machine that contains one or more pieces of waste;

1. Roadside Pile means a pile in which the majority of the pile area (footprint) is located adjacent to and within 20 metres of a road edge.
2. Dispersed Pile means a pile in which the majority of the pile area (footprint) is located

“Timber Sales Manager or TSM” means the Timber Sales Manager or the Timber Sales Manager’s designate;

“Tree” means any live or dead piece of a tree still attached to its roots having an average diameter equal to or larger than the TMS diameter for at least 3.0m of its length;

“Unavoidable Waste” means waste that meets or exceeds the Timber Merchantability Specifications that:

1. Is inaccessible or physically obstructed;
2. Could not be felled, bucked or removed due to safety reasons;
3. Could not be felled, bucked or removed due to physical, or environmental reasons;

“Unharvested” means a cutblock where:

- no timber is cut, or
- the timber is cut and not removed to a scale site.

“Volume Estimate” means the determination of a volume of material using sampling principles and measurements in accordance with this Manual;

“Volume Prediction” means a forecast of waste volume at the waste assessment areas or plot level;

“Waste” means timber, whether standing or felled, except timber reserved from cutting, which meets or exceeds the Timber Merchantability Specifications described in this Manual that was not removed from the cutting authority area by the agreement holder;

“Waste Assessment” means an assessment conducted in accordance with the procedures set out in the Manual for determining the volumes of Waste and Residue left on a harvested area following completion of harvesting operations;

“Waste Assessment Area” means a cutblock or a partial cutblock, which requires a waste assessment under the Forest Act and the agreement under which authority to cut timber is granted;

“Waste Benchmark” means the volume of avoidable waste, expressed in cubic metres per hectare that can be left on a harvested area without being subject to a monetary waste assessment;

“Waste System” means the online Waste System;

“WMRF” (waste monetary reduction factor) means a factor applied to the waste rate to generate a waste billing rate.

Appendix 4 Plot Planning Tables for Single and Aggregate Populations

Total Stratum Area (ha) (greater than or equal to)	Dispersed Strata - Minimum # of Plots		
	# of Measure Plots for SRS	# of Prediction Plots for Ratio	# of Measure Plots for Ratio
0.01	3	4	2
2.00	10	9	3
10.50	11	18	6
11.50	12	18	6
12.50	13	18	6
13.50	14	18	6
14.50	15	18	6
15.50	16	18	6
16.50	17	18	6
17.50	18	18	6
18.50	19	18	6
19.50	20	18	6
20.10	20	24	8
20.50	21	25	8
21.50	22	26	9
22.50	23	28	9
23.50	24	29	10
24.50	25	30	10
25.50	26	31	10
26.50	27	32	11
27.50	28	34	11
28.50	29	35	12
29.50	30	36	12
33.50	31	37	12
40.50	32	38	13
47.50	33	40	13
54.50	34	41	14
61.50	35	42	14
68.50	36	43	14
75.50	37	44	15
82.50	38	46	15
89.50	39	47	16
96.50	40	48	16
103.50	41	49	16
110.50	42	50	17
117.50	43	52	17
124.50	44	53	18
131.50	45	54	18
138.50	46	55	18
145.50	47	56	19
152.50	48	58	19
159.50	49	59	20
166.50	50	60	20

After the stratum size for the population reaches 166.50ha the rate of sampling will increase by 1 measure plot for every additional 30.00ha for SRS surveys and 1 prediction plot for every additional 30.00ha for Ratio surveys. Ratio survey measure plots will increase at a rate of 1 measure plot for every 3 prediction plots (rounded to the nearest whole number).

For Example:

Total Stratum Area (ha)	# of Measure Plots for SRS	# of Prediction Plots for Ratio	# of Measure Plots for Ratio
298.51	54	64	21

Traditional Spot Accumulation (Pile) Stratums - Minimum # of Plots			
Total Number of Piles (greater than or equal to)	# of Measure Plots for SRS	# of Prediction Plots for Ratio	# of Measure Plots for Ratio
1	1	1	1
2	2	2	2
3	3	3	2
4	4	4	2
5	5	5	2
6	6	6	2
7	7	7	2
8	8	8	3
9	9	9	3
10	10	10	3
11	10	11	4
12	10	12	4
13	11	12	4
15	11	13	4
18	12	13	4
20	12	14	5
23	13	14	5
25	13	15	5
28	14	15	5
30	14	16	5
33	15	16	5
35	15	17	6
38	16	17	6
40	16	18	6
43	17	18	6
45	17	19	6
48	18	19	6
50	18	20	7
53	19	20	7
55	19	21	7
58	20	21	7
60	20	22	7
63	21	22	7
65	21	23	8
68	22	23	8
70	22	24	8
75	23	25	8
78	24	25	8
80	24	26	9
83	25	26	9
85	25	27	9
88	26	27	9
90	26	28	9
93	27	28	9
95	27	29	10
98	28	29	10
100	28	30	10
103	29	30	10
108	30	30	10

After the stratum size for the population reaches 108 piles the rate of sampling will increase by 1 measure plot for every 30 additional piles for SRS surveys and 1 prediction plot for every 30 additional piles for Ratio surveys. Ratio survey measure plots will increase at a rate of 1 measure plot for every 3 prediction plots (rounded to the nearest whole number).

For Example:

Total Number of Piles	# of Measure Plots for SRS	# of Prediction Plots for Ratio	# of Measure Plots for Ratio
475	42	42	14

Other Accumulation Stratum (ie. Roadside) - Minimum # of Plots			
Total Stratum Area (ha) (greater than or equal to)	# of Measure Plots for SRS	# of Prediction Plots for Ratio	# of Measure Plots for Ratio
0.01	2	3	2
1.00	5	6	2
2.00	10	12	4
12.50	11	12	4
14.50	11	13	4
17.50	12	13	4
19.50	12	14	5
22.50	13	14	5
24.50	13	15	5
27.50	14	15	5
29.50	14	16	5
32.50	15	16	5
34.50	15	17	6
37.50	16	17	6
39.50	16	18	6
42.50	17	18	6
44.50	17	19	6
47.50	18	19	6
49.50	18	20	7
52.50	19	20	7
54.50	19	21	7
57.50	20	21	7
59.50	20	22	7
62.50	21	22	7
64.50	21	23	8
67.50	22	23	8
69.50	22	24	8
72.50	23	24	8
74.50	23	25	8
77.50	24	25	8
79.50	24	26	9
82.50	25	26	9
84.50	25	27	9
89.50	26	28	9
92.50	27	28	9
94.50	27	29	10
97.50	28	29	10
99.50	28	30	10
102.50	29	30	10
107.50	30	30	10

After the stratum size for the population reaches 107.50ha the rate of sampling will increase by 1 measure plot for every additional 30.00ha for SRS surveys and 1 prediction plot for every additional 30.00ha for Ratio surveys. Ratio survey measure plots will increase at a rate of 1 measure plot for every 3 prediction plots (rounded to the nearest whole number).

For Example:

Total Stratum Area (ha)	# of Measure Plots for SRS	# of Prediction Plots for Ratio	# of Measure Plots for Ratio
168.92	32	32	12

Appendix 5 *Dispersed Stratum* Grid Spacing Worksheet

Waste Grid Spacing Worksheet				
Sample Plan:		Aggregate Ratio Example		
Required Plots in Sample Plan:		44		
Plot Grid Formula:		SQRT(10000 * (Dispersed Stratum Area - External RoW) / # of plots)		
Cublock ID	Cutblock's Dispersed Stratum Area (ha) Excluding External RoW	Plots Required in Sample Plan	Calculated GIS Grid Spacing (m) Using Formula	Adjusted Grid Spacing (m) for Mapping by Hand
1	10.00	6	129	130
2	5.00	2	158	160
3	15.00	8	137	135
4	20.00	11	135	135
5	30.00	17	133	135
Totals	80	44		

Appendix 12 Waste and Residue Post Harvest Certification - Interior

Date:

Cutblock:

Reporting Unit:

Primary Timber Mark:

Y ☐ N ☐ Is the waste assessment area within a fully appraised adjustable rate cutting authority?

If Yes: Changed circumstance requirements apply. Proceed to next question.

If No: Timber is tallied as standing waste (e.g. BCTS) Standing waste is not tallied on tabular rate cutting authorities.

Y ☐ N ☐ Is there an approved amendment to the cutting authority harvest area?

If Yes: Timber that is amended out of the harvest area will not be tallied as waste. A changed circumstance reappraisal is required if the threshold is exceeded. Refer to the IAM for specific requirements.

If No: Therefore, standing timber is reserved. Proceed to the next question.

Y ☐ N ☐ Is there an absolute change in the reserve area(s), (for a waste assessment area within a cutting authority issued July 1, 2019 or later)?

Y ☐ N ☐ Is there a change in the leave tree characteristics, (for a waste assessment area within a cutting authority issued May 1, 2020 or later)?

If Yes for either of the questions above: A changed circumstance reappraisal is required. Refer to the IAM for specific requirements. Timber that is reserved in the reappraisal will not be tallied as waste.

If No for both questions above but unreserved timber remains (CP was issued before these dates): Timber is tallied as standing waste.

Description and location of standing timber (maps and tables attached as needed):

I certify the following regarding this waste assessment area:

Y ☐ N ☐ A changed circumstance reappraisal is required in relation to the information above.

Y ☐ N ☐ Timber remains that must be tallied as standing waste.

Name of Forest Professional:

ABCFP Professional Designation and Registration Number:

Signature: