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March 25, 2022

BY EMAIL

To: Regional Executive Directors

From: Allan Bennett, Director, Timber Pricing Branch

Re: Amendment No. 6 to the *Provincial Logging Residue and Waste Measurement Procedures Manual – Interior Version*

I hereby approve Amendment No. 6 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* in order to:

- Remove the large population sampling method,
- Introduce efficiencies in an expanded aggregate population method,
- Introduce the new simplified waste survey method,
- Incorporate efficiencies for Woodlot Licences and Community Forest Agreements as the interior sampling methods are applied to them,
- Expand the application efficient methods for small tenures,
- Introduce interim submission timelines to improve workflow for survey audits,
- Clarify the interaction between reserved timber, standing waste, and post-harvest reappraisals,
- Revised descriptions, definitions, and terminology to improve clarity.

Amendment No. 6 comes into effect on April 1, 2022.

Allan W. Bennett, RPF
Director
Timber Pricing Branch

pc: Melissa Sanderson, Assistant Deputy Minister, Forest Policy and Indigenous Relations Division
Patrick Asante, Manager, Timber Pricing
Jason Smith, Provincial Waste Specialist
Michael Wedel, Cruising and Waste Policy Forester

Amendment No. 6 – Provincial Logging Residue and Waste Procedures Manual – Interior Version

Highlights

Section, Table or Appendix Number	Description
1.3	This manual now applies to WL's and CFA's in the Interior.
1.3.3	Cutting authorities where stumpage is billed using area-based rates (IAM Table 6-8) are treated as cruise-based sales and do not require a waste survey. This is not a policy change; it describes a long-established procedure.
1.3.4	Procedures are established for FLTC's issued under the Licence to Cut Regulation Section 1 – Protecting Communities from Wildfire.
4.1	References to large populations are removed.
4.2	Late submission of a waste survey may result in billing delays.
4.2	Interim submissions for individual cutblocks are required to facilitate auditing throughout the year.
4.2.1	Each cutblock in a population has its own due date based on its PLC date.
4.3.2	Small tenures meeting specific criteria may not require field sampling; they would instead use district averages.
5.2	The description of an aggregate population is revised. There is provision for waste assessment areas that do not require sampling within an aggregate population, which receive the average waste level determined by the sampled cutblocks. The Option to create a large population has been removed.
5.3	The name of the aggregate population is no longer described by the word "small". Large populations are removed.
5.4	There are no effective changes in this section, but language has been revised for clarity.
5.5	Large populations have been removed.
6.1	Interim submissions for each cutblock within an aggregate must be submitted to the district within 30 days to facilitate office and field reviews. Large populations are removed.
6.2	References to cutblocks less than 2.0 ha have been removed. References to large populations have been removed.
6.3	The population structure of aggregate populations has several revised requirements. References to large populations have been removed.
6.4	Standing waste occurring as single or scattered trees can be tallied within the dispersed subpopulation or in the standing waste subpopulation. Descriptions of subpopulations and strata are revised to improve clarity.
6.5	Processes for selecting the number of required plots is aligned between single cutblocks and aggregates. Procedures for large populations are removed.
6.6	With the removal of large populations, an amendment to a sampling plan is expected to be very rare. An amendment requires an acceptable rationale.
6.7.2	Procedures for aggregate populations include provisions for non-sampled cutblocks in populations larger than 200 ha.
6.7.3	Procedures for large populations are removed.

8.1 to 8.4	Procedures for large populations are removed.
8.5	Types of roadside spot accumulations are determined by characteristics rather than a fixed distance from the road or landing. Wording has been revised to improve clarity.
9.5.2	Directions are revised to improve clarity for measurement of standing waste.
9.5.2.3	A patch of standing waste is defined as an area 0.05 ha or larger.
10	A new chapter is added to describe the simplified waste survey process.
11.2.2.2	The section has been revised for clarity.
Appendix 1	The definition of an Aggregate Waste Submission has been revised. The term "PLC" definition is revised to include CP expiry.
Appendix 3	Updated to include new or revised survey methods.
Appendix 4	The required number of plots in a single and aggregate population are now identical. They have been streamlined to provide more logical plot distribution for larger populations and very small populations.
Appendix 12	A template quality assurance statement is provided to describe standing timber remaining after harvest.

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

Effective Date

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



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1.3 Applicability

The manual is applicable to waste assessments located in the North Area, South Area, and Manning Park.

1.3.1 Application Dates

This manual applies to timber sales advertised, or cutting authorities issued on or after the dates specified in the most recent amendment of the *Provincial Logging Residue and Waste Measurement Procedures Manual*.

1.3.2 Scale Based Cutting Authorities

Where the amount of stumpage payable on the timber harvested from a cutting authority is calculated using the information reported in a scale of the timber, the holder of the agreement must conduct a waste assessment on that cutting authority.

1.3.3 Cruise Based Cutting Authorities

On a cruise based cutting authority, where the amount of stumpage payable is calculated using information reported in a cruise of the timber, the entirety of merchantable volume is billed as harvest volume. Therefore, the holder of the agreement is not required to conduct a waste assessment on that cutting authority.

On an area based cutting authority where the amount of stumpage payable is calculated using the Reserve Stumpage Rate (\$/hectare) listed in Table 6-8 of the Interior Appraisal Manual, the entirety of merchantable volume is billed as harvest volume. As such, that cutting authority is treated as a cruise based cutting authority and a waste assessment is not required.

1.3.4 Forestry Licence to Cut Issued Under Licence to Cut Regulation Section 1 - Protecting Communities from Wildfire

This section applies to Forestry Licences to Cut that are issued with a contract to intensively manage forest fuels for the purpose of protecting communities from wildfire. Waste in the dispersed subpopulation is minimized as part of the fuel management prescription.

This section applies to a Forestry Licence to Cut that meets all of the following conditions:

- 1) The Forestry Licence to Cut is issued under Licence to Cut Regulation Section 1 - Protecting Communities from Wildfire.
- 2) The cost of performing contract obligations is expected to be greater than the value of the forest products that are authorized for harvest. A documented process is used to ensure that economic harvest opportunities are identified and in those scenarios this section does not apply.
- 3) The Forestry Licence to Cut is issued as part of a contract under a government of BC program to protect communities from wildfire.

The contract is supervised by a qualified receiver (QR) who is a Government of BC employee or reviewed by an Area Specialist to ensure compliance with the contract.

- 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.

1.4 Responsibility

The responsibilities are as follows:

1.4.1 Timber Pricing Branch

1.4.1.1 Director, Timber Pricing Branch

The Director, Timber Pricing Branch is responsible for:

1. Approving *Provincial Logging Residue and Waste Measurement Procedures Manual* and amendments.
2. Processing and maintaining waste data.
3. Billing licensees by issuing waste invoices.

1.4.1.2 Residue and Log Salvage Policy Forester, Timber Pricing Branch

The Residue and Log Salvage Policy Forester is responsible for:

1. Developing and maintaining standards and procedures for determining and reporting waste.
2. Providing training and technical support.
3. Providing policy interpretation to industry and ministry staff.
4. Maintaining software compilation programs and standards.
5. Conducting technical reviews of Forest Regions and Forest Districts for policy and procedure compliance.

1.4.2 Area Manager

The **Area** Manager is responsible for:

1. Ensuring that district staff adhere to policy and procedures, and where necessary, provide training to district staff.
2. Recommending survey procedure changes where necessary, to the Director, Timber Pricing Branch.
3. Advising industry and forest district staff on matters relating to waste assessments.
4. Processing waste reports and FS 702 for waste monetary billing and cut control where required.

The applicable rates charged will include any bonus bids and levies as applicable.

1. Avoidable coniferous species graded:
 - a. Grade 1 and 2 are billed using the weighted average sawlog stumpage rate for the 12 month period multiplied by the waste monetary reduction factor (WMRF), and
 - b. Grade 4 is billed using the rates established in the *Interior Appraisal Manual*.
2. Avoidable deciduous species graded:
 - a. Sawlog is billed using either:
 - i. The appraised rate, or, if there is no appraised rate,
 - ii. The fixed rate for the species as specified in the *Interior Appraisal Manual*, and
 - b. Other than sawlog is billed using the fixed rate in the *Interior Appraisal Manual*.

3.2.2.1 Waste Assessment Areas with Harvesting

For waste assessment areas with harvesting, the waste rate for coniferous sawlogs is calculated using the weighted average stumpage rate charged for the sawlogs (grade code 1 and 2) in invoices issued during the 12 month period after the **PLC** date for the waste assessment area is achieved.

The formula to be used is:

$$WR=TS/TV$$

Where:

1. **WR**= The waste rate for the cutting authority
2. **TS***= Total billed sawlog stumpage (sum of Upset Stumpage*, and Bonus Bid) for timber harvested under the applicable timber mark for the twelve-month period ending one month after the month the waste assessment area was **PLC**
3. **TV***= Total billed volume (accumulated volume in cubic metres that derived the total billed stumpage for the sawlogs) for the twelve-month period ending one month after the month the waste assessment area was **PLC**
 - a. ***TV** includes silviculture and development levies

Remaining areas of standing timber within a waste assessment area that are left unharvested at the expiry, surrender, termination, or cancellation of the cutting authority are waste billed using the **PLC** date for the cutblock.

3.3 Waste Benchmarks

3.3.1 Benchmark Levels

The following waste benchmarks will be used for monetary billing of avoidable conifer sawlog grade waste volumes and are applied on an individual waste assessment area basis until further notice.

Table 3-3 Interior Benchmark Levels

	Dry Belt	Transition	Wet Belt
Benchmark Level	4 m ³ /ha	10 m ³ /ha	20 m ³ /ha

Where a cutblock or a partial cutblock contains one or more biogeoclimatic zones, the benchmark applying to the waste assessment area will be determined by the zone covering the largest proportion of the cutblock area.

The waste benchmarks by biogeoclimatic zone are available on the Timber Pricing Branch website.

3.3.2 Benchmark Eligibility

The benchmarks are administered on an individual waste assessment area basis. Therefore, each waste assessment area must be individually assessed to determine whether the avoidable waste within the waste assessment area is above or below the benchmark.

Waste benchmarks do not apply to unharvested cutblocks.

Merchantable volume that may be required to meet coarse woody debris requirements **must be tallied as waste** and will be included in the waste benchmarks. No special provisions are made for coarse woody debris in waste assessments.

4.1 Reporting Structure

Waste assessments are reported in the Waste System using a reporting unit that is unique to a Forest District and the client number associated with a licence (or licences).

In the Waste System, reporting units are created for the following reporting options:

1. Cutblock option – used to report a single waste assessment area as a sampling population.
2. Aggregate option – used to report multiple waste assessment areas as a combined sampling population.

4.1.1 Single Waste Assessment Area Population Reporting Units

Where the holder of an agreement uses the single waste assessment area option, each waste assessment area may be submitted:

1. In separate reporting units, or
2. In one reporting unit. Under this option, a new reporting unit must be created every calendar year.

4.1.2 Aggregate Population Reporting Units

Where the holder of an agreement uses the aggregate population option, waste assessment areas form an aggregate reporting unit. Individual reporting units must be created for each sample plan.

4.2 Timeframes

The completion and submission of waste surveys are linked to the completion of harvesting activities 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 the population will be submitted late. Survey data for waste assessment areas and the compilation of the waste survey results will be submitted as per the timelines below.

Table 4-1 Submission Timelines

Population Format	Submit Sample Plan to District Manager?	Initial Sample Plan Due Date	Waste Assessment Area Survey Map Due Date	Interim Submission	Compilation and Submission into the Waste System
Single Waste Assessment Area	No	N/A	A minimum of 1 day before the survey	Earliest of: 1. 30 days after survey date, or 2. Section 4.2.1.1 (hazard abatement etc.), or 3. Upon request	As required by: 1. Section 4.2.1.1, or 2. Section 4.2.1.2
Aggregate Population	Yes	A minimum of 7 days before starting the field survey			

Waste surveys must be submitted to the District Manager using the earliest timeframe as laid out in section 4.2.1.1 or 4.2.1.2, **whichever** occurs first.

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

In all cases, submissions must be completed prior to site treatments and hazard abatement requirements occurring.

When the access to a waste assessment area is restricted by snow, licensees may apply to extend the

completion timeline. The District Manager may extend the due date by 30 to 60 days after snow-free.

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

In accordance with Table 4-1, survey 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 field map,
3. stratum areas, and any supporting information required for the final aggregate submission.

4.2.1.1 Submission Requirements for Waste Assessment Areas Requiring Site Treatments or Hazard Abatement

This section applies to waste assessment areas that require site treatments or hazard abatement in the same year (first fall or winter) as the PLC date. Waste assessment areas must be surveyed and submitted to the District Manager the earliest of:

1. Thirty days prior to:
 - a. The commencement of any post-harvest site treatments that will alter the waste volumes or grades (i.e. stumping, burning, mounding), or
 - b. The reduction of the fuel hazard as required by the Wildfire Regulation section 12.1, or
2. No later than September 15.
 - a. Where a waste assessment area has a PLC date between August 15 and September 15, and site treatments or hazard abatement are to occur later in the fall, Licensees may apply to the District Manager to extend the completion timeline by 30 to 60 days. Extensions will not be granted if the required interim submissions have not been submitted within required timelines.

Where a waste assessment area that is selected for sampling in an aggregate sample plan is planned for site treatments or hazard abatement, and the population is not ready to be submitted into the Waste System, the survey information for waste assessment areas to be treated must be submitted to the District 30 days prior to those activities. Post-harvest treatments may commence at any time on waste assessment areas within an aggregate population that are not selected to be sampled in an aggregate sample plan.

Partial cutblock waste assessment areas may be submitted in order to complete waste assessment obligations prior to hazard abatement.

The District Manager may waive the 30 day submission requirement if the block:

- 1) is submitted to the waste system,
- 2) was reviewed, and
- 3) is not held for field audit.

4.2.1.2 Submission Requirements for Waste Assessment Areas Not Requiring Site Treatments or Hazard Abatement

This section applies to waste assessment areas that do not require site treatments or hazard abatement in the same year (first fall or winter) as the PLC date. Waste assessment areas must be surveyed and submitted as outlined below.

Where a waste assessment area has a PLC date between:

1. January 1st and July 31st, the waste assessment must be submitted no later than September 15th of the same year, or
2. August 1st and December 31st, the waste assessment must be submitted no later than June 30th of the year following the PLC date.

4.2.2 Submission of Waste Assessments Not Requiring a Field Survey

Waste assessment areas that will have the waste assessment volumes determined under section 4.3.2 (district averages) must be submitted no later than 30 days after the PLC date for the block.

4.2.3 Overdue Waste Assessments and Reports

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.

4.3 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 6-3 and area calculations **worksheet** must be included in the submission.
3. 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.**
4. 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.**
5. 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.
6. 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 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 Cutblocks Not Requiring Field Sampling

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.
2. Occupant Licence to Cut with a volume limit of 2,000 m³ or less.
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 blanket salvage cutting authority with a harvest volume of 2,000 m³ or less.

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

The waste volume 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. 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.

5.2 Sample Populations

The sample population is the total net area of all waste assessment areas where estimates of waste and residue volumes are required.

The population is determined by the number of waste assessment areas in the population.

The sample populations are:

1. Single Waste Assessment Area
 - a. The sample population is one waste assessment area.
 - b. In this population, a single waste assessment area is sampled to obtain the waste and residue estimate.
2. **Aggregate** Population:
 - a. The sample population contains 2 **or more** waste assessment areas **with a total net area of less than 3,000 ha**.
 - b. Waste assessment areas in **an aggregate** population are aggregated into one population for sampling and reporting.
 - c. In an aggregate, the results for the population are applied to each waste assessment area within the population, with each **stratum** receiving the same estimate of volume per hectare by species and grade.
 - d. **Waste assessment areas within the aggregate that are not selected for sampling do not require stratification. These waste assessment areas are assigned stratum areas proportional to the total stratum areas of the sampled waste assessment areas.**

5.3 Sampling Designs

The sampling principles used to collect and compile waste information are simple random sampling (SRS) and ratio adjustment (Ratio) sampling. The sampling design names specify which principle is used.

5.3.1 Single Waste Assessment Area or **Aggregate Population Sampling Designs**

The following designs are used on single waste assessment areas or **aggregate** populations and employ a single sampling principle to develop the result:

- SRS, or
- Ratio.

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.

In a prediction plot, the surveyor must predict (estimate) the total volume (m³) of merchantable timber 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.

6.1 Waste Sample Plan Development and Implementation

A waste sample plan involves the creation of a population using one of the sample designs described in Chapter 5 and calculation of the required number of plots for each waste assessment area in the plan.

The waste sample plan is the key document that provides the information needed by the waste surveyor to complete a waste survey and provides assurances to the Ministry that the waste assessment data was collected in an unbiased manner.

Waste sample plans are professional documents and must be:

1. Prepared by a qualified registered member (RPF, RFT) of the Association of BC Forest Professionals, or
2. Supervised and endorsed by a registered member (RPF, RFT) of the Association of BC Forest Professionals.

A licensee must submit initial and completed waste sample plans, and a waste assessment area survey map in accordance with section 4.2. A completed waste sample plan is prepared after all field surveying is complete and is submitted with the sample population.

The waste sample plan **must be compliant with procedures within this manual; however it** is not required to be approved by the District Manager.

A review of the sample plan may be completed at the time of initial submission or at the time of the final waste submission at the discretion of the District Manager. The initial plan will be compared to the final submission to ensure compliance with this manual.

6.2 Sample Plan Composition

6.2.1 Waste Assessment Area

A waste sample plan is composed of waste assessment 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.

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.

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.

6.4.1.3.2 Standing Waste Occurring as Single or Scattered Trees

The method used to stratify single or scattered tree standing 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.

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 from all sampled waste assessment areas within the population.

6.6 Amendments

The integrity of a sample design depends on the identification of a population prior to sampling, and an unbiased plan that remains unchanged. Changes to a plan can significantly impact the sample size and the number of plots required. Since all waste assessment areas must be “primary logging complete” when the sample design is created, any amendments to a sample plan are expected to be very rare. Population and stratum areas affect the number of required plots and plot spacing; therefore, the sampling plan must be correct and durable. A waste survey may be rejected if there are unsubstantiated changes between the plan and the final submission.

Changes to a sampling plan should only be related to issues that affect good forest management or other operational issues (i.e. wildfire or landslide occurred after the sampling plan was submitted).

The submitting forest professional recognizes that changes to a plan, such as the addition or removal of a waste assessment area or a significant change in area will significantly alter the sample plan requirements. The forest professional will assess the impact of the changes against the principles of sampling identified in these standards.

The submitting forest professional will submit a rationale for any changes to a sample plan. This model is consistent with the direction of professional reliance.

For guidance on how to prepare a professional rationale, please refer to the document *Guidance for Professional Quality Rationales and Commitments* published by and available on the Association of BC Forest Professionals website.

The District Manager, applying the principles identified in this manual, will make a determination on each change on a case by case basis and decide if the amended plan is acceptable.

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.
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 only the waste assessment areas selected for sampling to determine the sample size:
 - 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 Planner. 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. Prepare waste assessment area survey maps,

8. Submit the sample plan **report** and waste assessment area survey maps.

6.8 Waste Assessment Area Survey Map

Once an initial sample plan is complete, a waste assessment area survey map must be created.

The initial waste assessment area survey map **must meet requirements of this manual but** is not required to be approved by the District Manager.

6.8.1 Waste Assessment Area Survey Map Requirements

The maps used in a waste survey must accurately reflect the post-harvest condition of a cutblock including the location and shape of areas of unharvested standing timber, and reserved timber, whether grouped or dispersed.

A waste assessment area survey plan map must show the cutblock boundaries, roads, the point of commencement, **point of intersection**, strip and plot locations, stratum types and locations, and any other areas that are excluded from waste estimations.

The waste assessment area survey plan map is required as part of a complete waste submission. The cartographic standards used by the Ministry of Forests, Lands and Natural Resource Operations are mandatory. Maps drawn digitally must be produced using geographic information system (GIS) software (i.e. ArcGIS).

The waste assessment area survey plan map must:

1. Be legible and of good quality 1:5,000 scale,
 - a. Note: a 1:10:000 scale map may be accepted at the discretion of the District; however, it will be rejected if the required items cannot be mapped legibly due to the scale,
2. Provide neat and clean lines, lettering and numbers,
3. Reflect the post-harvest conditions of the cutblock, and
4. Include the items indicated in Table 6-3.

Only one waste assessment area survey map may be submitted for each waste assessment area and it must align with the submitted sample plan.

After the field survey is completed, the final waste assessment area survey plan map must be submitted with the waste submission.

Accumulations, standing trees not harvested, and areas subject to 100% measurement or estimation must be clearly indicated on the final waste assessment area maps. In situations where there are a significant number of piles and they cannot be mapped neatly, individual pile locations do not need to be shown; however, the pile plot locations must be identified on the final map.

Table 6-1 Waste Assessment Area Survey Plan Map and Final Waste Submission Map Requirements

Requirements	Waste Assessment Area Survey Plan Map	Final Waste Submission
Tenure, CP, timber mark areas	Yes	Yes
Forest Region and District	Yes	Yes
Cutblock identifier	Yes	Yes
Map scale	Yes	Yes
Harvest boundary (with verifiable reference points such as falling corners)	Yes	Yes
Non-harvest areas (non-productive etc.)	Yes	Yes
Biogeoclimatic zone(s) (Interior)	Yes	Yes
North arrow, declination, map base	Yes	Yes
Cutblock maturity (where applicable)	Yes	Yes
Roads and other NP areas	Yes	Yes
Areas of reserved timber and zones of partial cutting (when identified in a cutting authority and appraisal)	Yes	Yes
Areas of high stump exemptions	Yes	Yes
Strata type lines and identifier	If known	Yes
Waste assessment area and strata net areas	If known	Yes
POC, point of intersection , local grid, baseline, Starting Point Interval Factor (SPIF), and plot	Yes	Yes
Strip line direction of travel	No	Yes
Contour lines - clearly legible	Yes	Yes
Physiographic features	Only if they affect sampling	Only if they affect sampling
Reporting unit number	If known	Yes
Surveyor name(s)	If known	Yes
Sampling design	Yes	Yes

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 total area of a waste assessment area that was authorized to remove timber and/or will contain waste material from the waste assessment area.

When any changes to harvest or reserve areas have occurred:

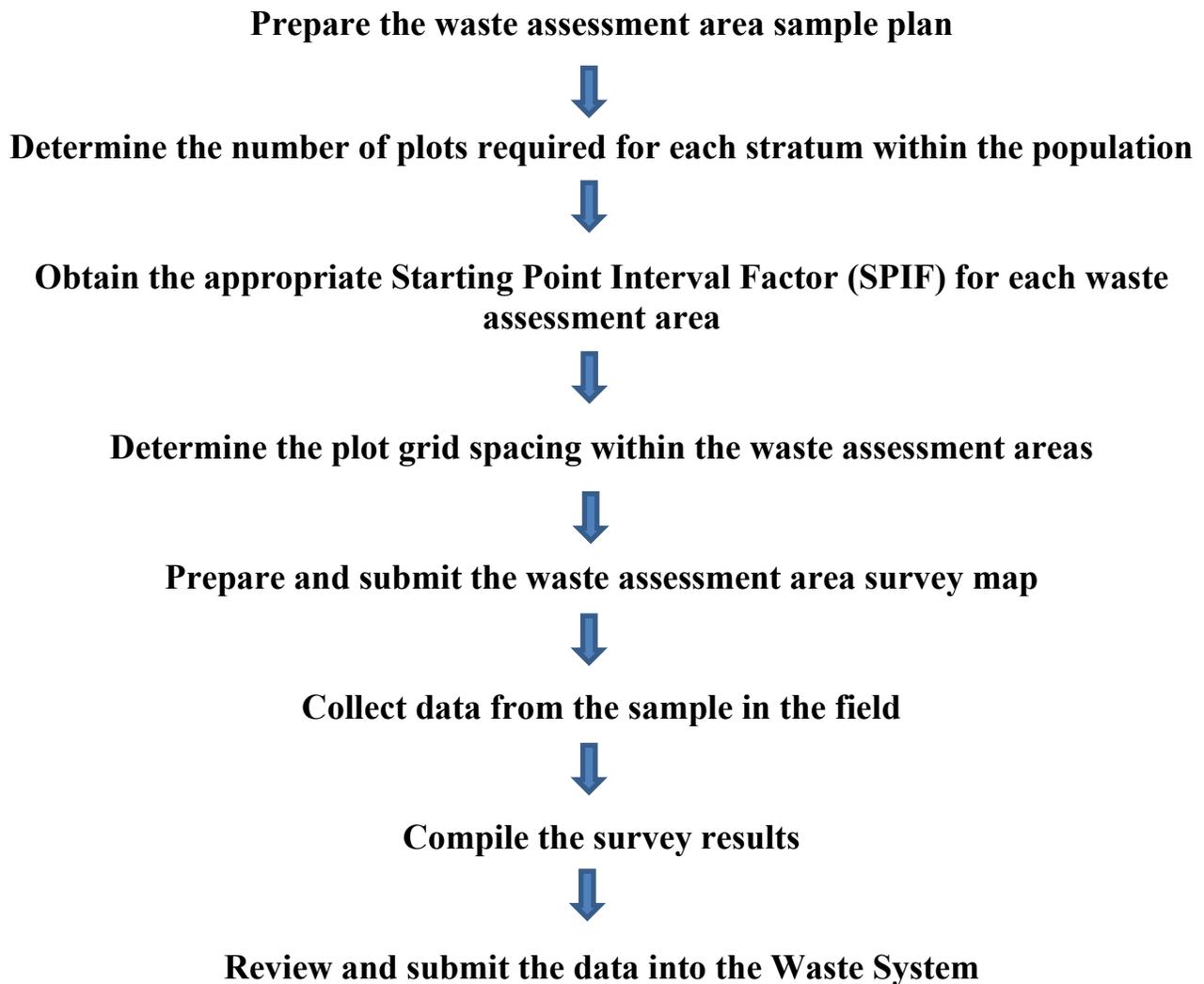
1. The correct areas must be used in the sample plan. These areas must align with the areas stated in the post harvest certification document where applicable,
2. Prior to completing any field work, updated maps (with maps and tables attached for standing timber as described in the Waste and Residue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

7.1.1 Net Waste Area Calculation

1. The net waste area is calculated as follows:
 - a. Determine the gross harvested area
 - b. Subtract any mapped retention from the waste assessment area's gross area
 - c. Add the sum of the area associated with external roads and/or any external landings to the figure determined in step ii
 - d. Subtract the area of all non-productive areas (i.e. built road surface) from the figure determined in step iii.
2. 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.
3. Waste assessment area net areas are increased by adding external areas containing waste volumes attributable to the cutblock (i.e. external landings or road permit areas outside of the cutblock).

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 inter-plot spacing (grid spacing) must be determined. The grid spacing is calculated by taking the square root of $(10,000 * \text{area (ha)} / \# \text{ of plots})$.

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.

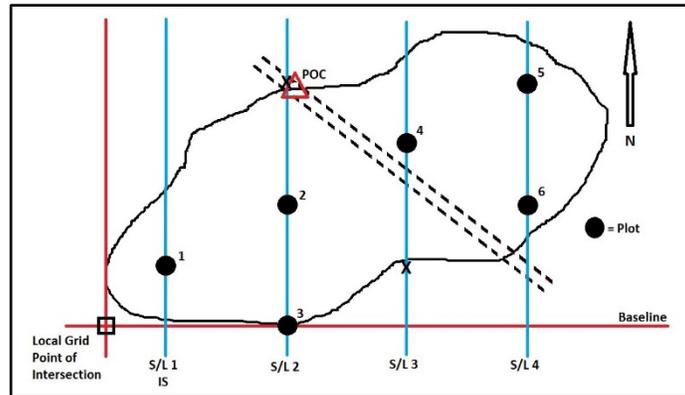
8.4.2 Plot Location

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 (**for each cutblock within the plan**). 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.

Figure 2 provides an example of the dispersed plot design.

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



8.4.3 Plot Allocation

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

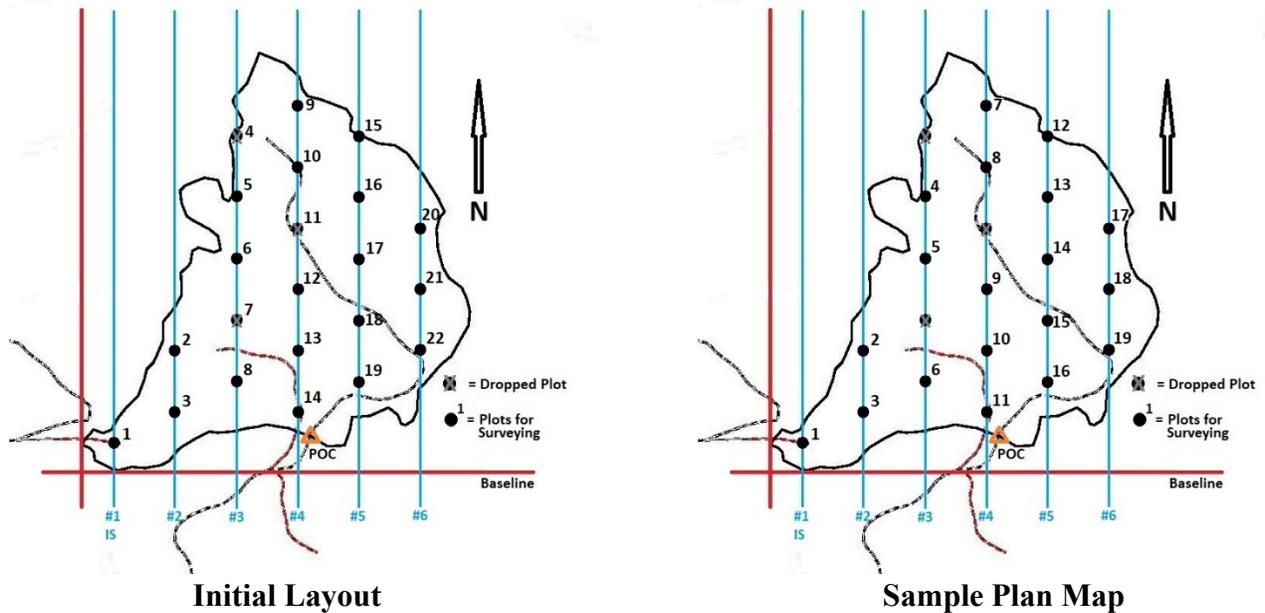
1. Adjust the GSD interval in ten (10) metre increments until the number of plots is greater than the number of plots required, and
2. Apply the following rules in order to reduce the number of plots until the desired number of plots is achieved.
 - a. The first dropped plot will be determined by multiplying the total number of plots in the waste assessment area by the SPIF for the **PLC** month of the waste assessment area.
 - 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 PLC date 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



8.5 Spot Accumulation Stratification and Plot Layout

8.5.1 Stratification

The options to stratify spot accumulations are:

1. Stratify **piles occurring at roadside and throughout the dispersed** as one stratum. (8.5.1.1), or
2. Stratify **piles occurring at roadside** as one stratum. (8.5.1.2), or
3. Stratify roadside spot accumulations and dispersed spot accumulations as two separate **accumulation** strata (8.5.1.3).

8.5.1.1 Roadside and Dispersed Spot Accumulations as One Stratum

If all **of** the spot accumulations are to be sampled as one stratum, the spot accumulations must be identified as a unique stratum and are defined using the following criteria:

1. The piles are located **at roadside and throughout the dispersed**.
2. All piles within the waste assessment area are counted.
3. The piles are **stratified and** sampled separately from the **other** strata.
4. The **corresponding** area of the spot accumulations must be removed from **both** the dispersed and roadside strata areas.

8.5.1.2 Roadside Spot Accumulations

If the roadside spot accumulations are to be sampled as one stratum, the roadside spot accumulations must be identified as a unique stratum and are defined using the following criteria:

1. **The piles are located in receiving areas, such as landings and roadsides where trees have been forwarded and manufactured into logs.**
2. **All piles in receiving areas adjacent to landings and roadsides are counted.**
3. The roadside piles must be **stratified and** sampled separately from the **other** strata.
4. The area of the spot accumulations must be removed from **the other** stratum area.

8.5.1.3 Dispersed Spot Accumulations

Dispersed spot accumulations may be identified as a unique stratum **within the accumulation subpopulation** and are defined using the following criteria:

1. **The piles are located within in areas from which trees have been cut and forwarded away from the stump.**
2. **All piles in areas from which trees have been cut and forwarded away from the stump are**

counted.

3. The piles are stratified and sampled separately from the dispersed stratum.
4. The area of the spot accumulations must be removed from the dispersed stratum area.

If the dispersed spot accumulations are not stratified as a unique stratum, any spot accumulations landing within a dispersed plot must be sampled and included in the dispersed subpopulation.

8.5.2 Sampling Dispersed Spot Accumulations

Dispersed spot accumulations found within a waste assessment area may be surveyed in one of two different ways – as part of the dispersed stratum or as a unique spot accumulation stratum.

1. Spot accumulations in the dispersed stratum, when not stratified are surveyed as part of the dispersed subpopulation. Dispersed stratum plots:
 - a. Must include any piles or portions of piles contained within the plot boundary,
 - b. Cannot be moved or altered to exclude piles or portions of piles,
 - c. All accessible pieces that fall within the plot will be measured and recorded,
 - d. A measure factor will be applied to account for inaccessible pieces.
2. If spot accumulations in the dispersed stratum are stratified, they are surveyed separately from the dispersed stratum:
 - a. Dispersed plot centers must be offset away from all pile accumulations,
 - b. The procedures in section 9.2.6 are used as required to avoid overlapping a spot accumulation stratum, and
 - c. Dispersed plots must retain a 200 m² size.

8.5.3 Numbering Procedures

The selection of sample piles must be completed in a systematic and random manner. Pile numbers must be either marked on a minimum of 1 out of every 10 piles or in a method that provides for replication of sampling procedures for auditing purposes.

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 samples required,
3. Identify the sample piles to be measured, and
4. Measure the required pile attributes for the selected samples.

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 prediction and measure samples required,
 - a. Identify the sample piles to be predicted and measured
3. Complete predictions, and
4. 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.

9.2 Plot Establishment

Sample plots must be established at the location identified on the waste survey plan. Moving plot centers from the measured or traversed location presents significant bias and is only permitted in accordance with section 9.2.6 of this manual. If the plot cannot be completed safely, the procedures outlined in section 9.2.7 of the manual are to be used.

9.2.1 Plot Sizes

Plots in dispersed must be 200 m².

Plots in accumulations and roadside strata may be rectangular or circular, or other shapes as required and must be 50 m². External right of way areas must use 50 m² rectangular plots when sampled as a separate stratum (OT0X).

The formula for calculating the horizontal plot radius is: $SQR(\text{plot size in m}^2 / \text{PI})$, where SQR means "the square root of", and PI means 3.1415927.

The plot sizes and recommended shapes are as follows:

Open slash	200 m ² round (radius = 7.98 m)
Felled and bucked	200 m ² round (radius = 7.98 m) or 100% scale if area is small
Accumulation strata not listed below	50 m ² round (radius = 3.99 m) or rectangular (i.e. 5 m x 10 m)
Roadside accumulations	50 m ² rectangular (for strips 10 m wide or less). 50 m ² circular (for a 15 m wide strip, locate plot centers alternatively at 4 m and 11 m from the roadside). 50 m ² rectangular (for strips greater than 15 m wide).
Cold decks	100% scale or percent estimate.
Road deactivation Material	100% scale or percent estimate.

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 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 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.

location.

9.2.7 Waste Survey Safety Procedures

In accordance with WorkSafeBC section 3.12(1) of the Occupational Health and Safety Regulation: “A person **must not** carry out or cause to be carried out any work process or operate or cause to be operated any tool, appliance or equipment if that person has reasonable cause to believe that to do so would create an undue hazard to the health and safety of any person.”

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

The objective of this section is to provide an alternative method of determining waste volumes where a portion or the entire plot or waste assessment area cannot be measured safely.

The procedures are intended to provide the surveyor with a set of procedures to follow in the order listed below that will provide the best available information and support the key principles of sampling while maintaining worker safety.

1. Where a piece or portion of a plot or an entire plot cannot be measured safely, attempt to complete the piece or plot through estimation from a nearby location.
2. Where the plot cannot be measured or estimated safely, move the plot to a safe location as specified in section 9.2.6.
3. When a plot must be dropped for safety, use replacement data of an existing plot from the same cutblock or licence that has similar waste levels, species, grade profile, age and method of harvesting. The surveyor may have to use a measure factor to adjust the volume to make it representative of the actual waste levels.
 - a. If replacement data from another plot is used, ensure the volume is the same or less of the dropped plot
 - b. If the volume is less, then apply the measure factor to increase the waste volume to the appropriate level. The Waste System cannot reduce a plot volume; therefore, assigning a measure factor greater than 100% will not work.
4. Where more than half of the plots cannot be established safely, the waste volumes on the waste assessment area can be determined using the following alternate method:
 - a. Within a single or aggregate sample plan, use the procedures in section 4.3.2 (**district averages**).

9.5.2 Trees and Standing Waste

Trees that are unharvested and included in the final appraisal or reappraisal are considered as avoidable waste. There are reappraisal considerations, which supercede the treatment of waste, and the licensee must refer to the appropriate appraisal manual. Standing waste does not apply in non-appraised (tabular stumpage rate) cutting authorities.

The treatment of trees in a waste survey must align with their treatment in the final appraisal or reappraisal.

- If the harvest area is changed through a cutting authority amendment, timber that is amended out of the harvest area is not tallied as waste. A reappraisal may also be required by the appraisal manual, as a result of the change in harvest area.
- A reappraisal may be required by the appraisal manual, as a result of a change in the reserve areas or leave tree characteristics. Timber that is reserved in the final appraisal or reappraisal is not tallied as waste.

Since the final appraisal or reappraisal may not be available at the time of a waste survey, the licensee must provide a signed quality assurance statement, which is submitted as part of the waste survey. The statement specifies the treatment of remaining timber in the final appraisal or reappraisal and in the waste survey.

A quality assurance statement template is provided in Appendix 12.

The surveyor must reference appropriate documents such as the cutting authority, the appraisal, and maps as submitted into ECAS to determine the conifer and/or deciduous leave trees identified by species to be retained as reserved timber for the area being waste assessed.

9.5.2.1 Recording Trees

For standing trees, record as "T" under "Kind of Material" and classify the trees as avoidable. For downed trees, record "D" and classify the trees as either avoidable or unavoidable. Enter the dimensions for length, top and butt diameters, end codes, and assign a log grade.

9.5.2.2 Individual Tree Measurements

Tree length is determined using a tape/chain and a clinometer or an electronic measuring device such as a laser instrument. The waste surveyor estimates the location of the timber merchantability specification top diameter, and then measures the length from this point down to the timber merchantability stump height. To record as a piece, the tree must contain a 3 m log that meets the timber merchantability specifications.

Record the timber merchantability specification top diameter in rads as the top diameter. If the top is broken, estimate the diameter in rads at the break.

The butt diameter is the tree diameter at the timber merchantability specification stump height, accounting for flare (see *Scaling Manual* section 6.2.2).

Trees are measured, recorded, and graded as a single piece, they are never pencil bucked into multiple pieces.

9.5.2.3 Trees in Patches

For trees that were left in a patch where individual tree measurement is impractical, the waste surveyor will measure the precise area represented by the tree patch (i.e. perform a closed traverse or traverse using GPS). A patch is defined to be a grouping of trees occupying an area of equal to or greater than 0.05 hectare.

The volume may be determined by:

1. Using the cruise compilation information from the appraisal, or
2. Completing a cruise of the timber. The cruise must be completed to the standards contained within the *Cruising Manual*.

Use the procedures in 9.5.2.4 to determine the volume, species, and grade allocations for the waste submission.

9.5.2.4 Volume, Species, and Grade Allocations for Standing Timber

The cruise net volume per hectare (for the applicable timber type(s)) will be used to determine the volume of timber in unharvested tree patches or waste assessment areas.

To obtain the volumes, use the timber type summary report from the net cruise compilation report for the timber type corresponding to each of the patch location(s) or the block summary report when a patch covers multiple timber types.

The grade allocations for tree patches, are based on the historic billing grade profile of the timber mark for the cutting authority from the Harvest Billing System (HBS). The grade profile can be obtained in HBS by running the Mark Monthly Billing History Selection Report for a twelve-month period ending one month after the month primary logging was completed for the waste assessment area.

Only in the absence of the billing history records, the net cruise volume and species for the waste assessment area being surveyed are used. The grades default to sawlog except for dead potential volumes which are recorded as grade 4.

9.5.2.5 Partial Cut (Variable Retention)

Timber volume that is left in excess of the leave volume and is not included in a reappraisal of the cutting authority will be billed as waste subject to the application of the waste benchmarks.

Surveyors should reference appropriate documents that provide the volume percent reduction by either one or more of species, timber type, risk group/tree class or treatment unit for each individual cutblock within the cutting permit or agreement.

There are two methods for determining the unharvested standing tree volume in a partial cut – by re-cruising the waste assessment area or by tallying the standing timber in fixed area waste plots. Choose a method that is appropriate for the waste assessment area:

1. For a re-cruise, a licensee must put in a sufficient number of cruise plots that will either achieve the sampling error objective as stated in the *Cruising Manual*, or meet the conditions required to waive it.
 - a. Once the unharvested standing tree volume has been derived, the timber scale grades will be assigned using the procedure described in section 9.5.2.4 to obtain the volume, species, and grade profile for the waste submission.
2. If waste plots are used, the plot size should be 200 m². Licensees are encouraged to use a higher sampling intensity than the minimum sampling requirements for the waste stratum.

The survey results for cutblocks that have been harvested using partial cut systems must be sponsored by an RPF or RFT. When there is no standing timber to report, an assurance statement must be submitted into the Waste System by a forest professional confirming that the partial cut timber harvesting requirements stated in the Schedule B or the Percent Reduction Report in the Appraisal Cruise Compilation Submission have been met.

If a field or office review by ministry staff identifies an apparent discrepancy with the species or volume harvested, the licensee or the TSM may be directed by the District Manager to re-cruise or resurvey the residual standing trees.

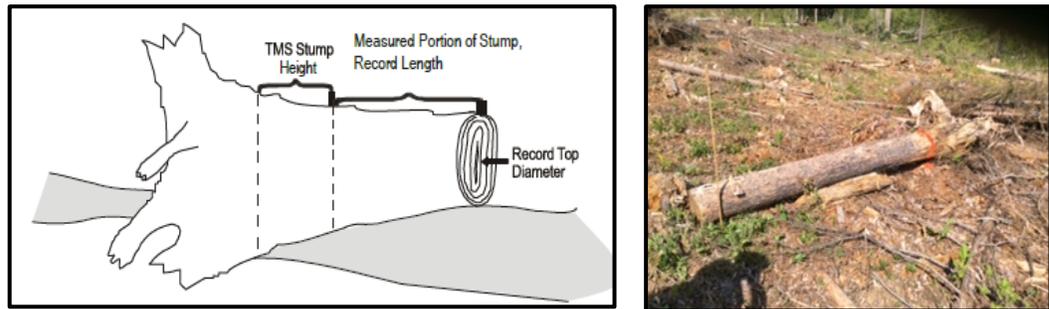
9.5.2.6 Unharvested Cutblocks

Unharvested **timber or entire cutblocks** in an expired, surrendered or cancelled cutting authority where harvest has occurred on the cutting authority **may require a reappraisal. Timber that is removed from the appraisal of a cutting authority is not considered as waste.**

Any remaining timber or cutblocks that are not removed from the appraisal of a cutting authority are considered as waste. Billing is based on the net cruise volume attributed to the unharvested cutblock.

The procedure described in section 9.5.2.4 will be used to obtain the volume, species, and grade profile for the waste submission.

Figure 10 Examples of Windfall Stumps



9.5.5 Bucking Waste

Bucking waste is defined as any piece:

1. That is 50% or more of the original log diameter and meets the TMS, except for slabs that are recorded as bucking waste (see section 9.5.3.1), and
2. With a gross length less than 3 m (originating from a log at least 3 m in length) that has been cut at the **butt** or at both ends.

A piece cut at the top and broken at the butt is:

- Not recorded in the dispersed subpopulation as it is breakage
- Measured and recorded as bucking waste in accumulation subpopulations.

If the logging system was inappropriate or there was excessive breakage in the dispersed subpopulation then all pieces cut at the small end (top) and broken at the large end (butt) should be recorded as avoidable breakage.

Examples of bucking waste:

1. Tops bucked off at a diameter larger than the TMS diameter,
2. Long butts,
3. Pieces where the 0.1 m trim allowance has been exceeded, or
4. Pieces where decay has been bucked off a log and the remaining piece is more than 50% sound.

Examples of bucking waste that are not measured are:

1. Trim ends less than 50% sound which are less than the dimensions of a slab,
2. Trim ends which are heavily fractured,
3. Pieces less than 50% of its original log diameter (at the butt) with a broken end and a gross length of less than 0.4 metres.

9.5.8 Cold Decks

Cold decks are five or more grade 1, 2, 4 or 6 (when required to be measured) logs that are mechanically placed together in a deck.

Cold decks that are to be included in a waste assessment must be measured using a **100% scale** or percent estimate method. Another acceptable estimation method is a top scale which is the determination of the average piece size multiplied by the number of pieces. **Cold deck pieces are not limited to logs. All waste that falls within the cold deck stratum area must be tallied.**

9.5.8.1 Road Deactivation Material

Road deactivation material is timber previously used in the construction of a culvert, bridge, other required structure.

At the time of a waste assessment, all road deactivation material that has not been previously scaled must be included in the waste assessment. All road material must be measured within a cold deck stratum using the **100% scale** or percent estimate measurement methods, unless it is unsafe, then the volume may be estimated using an accepted method.

9.5.9 Coarse Woody Debris

Log pieces that may be required to meet coarse woody debris requirements are included in the waste benchmarks.

9.5.10 Special Cases

Waste surveyors often encounter pieces that are hard to classify as waste or breakage, or as avoidable or unavoidable. A few of these circumstances are listed here:

1. Embedded rock, usually resulting from blasting. If the pieces are trimmed within 20 cm of the rock, such pieces may be classified as unavoidable. If the pieces have been trimmed longer, the segment beyond the rock should be classified as avoidable, without making any trim allowance,
2. Chunks on the tail-spar or skidding trails used to support the roadbeds, that resulted in the breakage of pieces greater than the minimum log length. Such pieces are classified as avoidable, and may be graded according to the characteristics of the whole piece,
3. Windfalls will be tallied in the usual manner for in-plot portions. The exceptions are windfalls that are blown down after harvesting with their roots sitting outside the block. These pieces will not be tallied,
4. 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, or
5. Chunks in the landing, bucked at both ends and used to support a steel tower. Classify as

Field	Data Requirement		Data Format	Comments
	Field	Compilation		
Location	Optional	Optional	Alpha	
Logged From	Optional	Required	Numeric	The year primary logging started
Logged To	Optional	Required	Numeric	The year primary logging was completed
Logging Completion Date	Optional	Required	Date	PLC date
Survey Date	Required	Required	Date	The date the survey started
Net Area (ha)	Required	Required	Alpha, 2 decimals	Area, in hectares, of the total area of all stratum areas available for sampling and/or estimating.
NP/NF area	Optional	Optional	Alpha, 2 decimals	Area, in hectares, The total area of road surface or non-productive area.
Waste Benchmark Zone (Interior Site Code)	Required	Required	Numeric	Quantifies, in cubic metres per hectare of the avoidable waste threshold
Cruise Volume	Not required	Optional	Numeric	Quantifies, in cubic metres per hectare, the average cruise volume for the block. Data is available from cruise summaries.
Reason for Survey	Not required	Required	Alpha	

9.6.2.2 Standing Tree Stratum Codes

Depending on the assessment method used, the stratum codes are:

Table 9-7 Standing Tree Stratum Codes

STRS	Where 100% of standing trees are measured individually.
STRE	Where standing tree volumes in a patch are estimated using the estimate percent method.

9.6.3 Completion of the Plot Tally Card

Refer to Appendix 8 for example tally card.

A Plot Tally card must be completed for each plot established.

1. If a plot has no pieces, record Nil Plot in the notes section.
2. If using paper tally cards and more than one page is required
 - a. Record the page number on all pages, and
 - b. Fill out the header line on all individual plot cards so they can be identified and reunited should they become separated.

9.6.3.1 Plot Tally Card

The plot tally card data fields contain the general identification information for the waste assessment area.

Note: the fields shown below may vary depending on what method is used for data collection (i.e. FS 444 card versus EForwasteBC).

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.
- 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.

The following additional requirements must be met to use the simplified waste survey:

1. The cutblock must be within a cutting authority that was cruised with a sampling error of 15.0% or less.
2. All cutblocks in the cutting authority are PLC at the time of waste assessment calculation.
3. This method cannot be used if any cutblock within the cutting authority has an outstanding late waste assessment or the waste submission has been submitted later than the date required in this manual.

10.1.3 Waste Volume Calculation

The total waste assessment volume is determined for the cutblock as follows:

The difference of

Net Cruise Volume – Total Harvest Billing Volume

Where

Net Cruise Volume = (the total net cruise volume for the cutting authority as submitted in ECAS) * (the net merchantable area of the cutblock) / (the net merchantable area of the cutting authority)

Total Harvest Billing Volume = the total scaled volume from the cutting authority as invoiced in HBS * (the net merchantable area of the cutblock) / (the net merchantable area of the cutting authority)

10.1.4 Species, Grade, and Classification

The species distribution may be calculated using the percentage breakdown that is reported for the cutting authority in the Appraisal Summary Report of the cruise from ECAS.

The grade distribution is calculated using the district average waste reports produced by Timber Pricing Branch. For each species, three categories must be reported:

1. Avoidable Sawlog waste m³/ha
2. Avoidable Grade 4 waste m³/ha
3. Unavoidable waste m³/ha

10.1.5 Population, Subpopulation, and Stratum

The population size is reported as the net merchantable area of the cutblock as submitted in ECAS. Where applicable, road permit area is included in the area.

The entire survey volume may be reported in one dispersed subpopulation and one dispersed stratum. This will allow simplified data entry.

10.1.6 Reporting

The following files must be attached to the WASTE submission for a simplified waste survey:

1. A worksheet with values and calculations to determine eligibility and waste assessment volumes.
2. A map of the cutblock and road permit area.
3. HBS Cut to Cruise Comparison Report.
4. HBS scale reports (Mark Monthly Billing History Selection Report) showing total harvest volume delivered secondary fibre facilities, if applicable.
5. ECAS Appraisal Summary Report.

11.1 Check Surveys

11.1.1 Introduction

Timber Pricing Branch is responsible for setting the standards for waste surveys, while licensees are responsible to meet these standards.

The Ministry audits waste survey information to ensure the standards within this Manual are **achieved**. **Quality assurance audits** support the principles of the Take or Pay Policy, revenue **control**, cut control, and ensure the consistent application of waste information in the billing process.

11.1.2 Objectives

The objectives of quality assurance are to ensure:

1. The integrity of the sample design by assessing the accuracy and completeness of:
 - a. The sampling plan, and
 - b. The waste assessment area survey map.
2. Waste measurements, classifications, and procedures were carried out as described in this Manual,
3. The survey has been completed within the net volume and value and individual parameters identified in this section,
4. Field assessments and reports were completed and submitted on time, and
5. The reports generated from the HRC are consistent with the survey plan and reflect the data collected in the field.

If any of the preceding components of the survey are not acceptable, the Licensee must undertake corrective actions to ensure the survey meets the minimum Ministry standards.

Timber Pricing Branch may consider exceptions to these standards in extenuating circumstances on a case by case basis.

11.1.3 Check Survey Timing

It is the Ministry prerogative to conduct a check survey at any time.

Post harvest treatments cannot commence until the waste survey audits have been completed, audited, and approved in the Waste System.

11.2 Check Survey Standards and Procedures

Check surveys verify that the sampling plan was developed according to the standards and that the field measurements were collected and recorded correctly.

Check surveys may be comprised of office checks of the survey planning process or checking of the field survey work and data submitted to the Waste System.

Field checking may constitute audits of plot location, waste assessment area strata delineation, piece data audits, or a combination of all.

The check survey **requires remeasurement of** attributes that were measured in the original survey. The full survey or parts of a survey of a waste assessment area or a reporting unit can be accepted or rejected based on the results of the check survey.

Field Services staff may check more than the minimum requirement if it is necessary to ensure compliance with the manual standards (i.e. previous check(s) showed borderline acceptable work).

When requested by the Ministry, the licensee must submit the original waste survey data in the format it was collected (either digital format or paper tally cards), a copy of the final survey plan map, area calculations, and any notes related to the survey. Digital plot data must be submitted in a **standard, accepted** format.

11.2.1 Field Check Requirements

The required number of plots **required in an audit are:**

1. **Single or Aggregate** Populations

- a. In each accumulation stratum, at least 10% of the measure plots, or a minimum of two plots, whichever is greater, and
- b. In each dispersed stratum, at least 10% of the measure plots, or a minimum of five plots, whichever is greater.

An audit of an aggregate population may include plots from more than one cutblock to meet the requirements above. In an aggregate population, the minimum number of plots to be checked is based on the number of plots from the sample plan and any other strata that exist within the waste assessment area being checked. Prediction plots may be checked at the discretion of the auditor. To reject a survey based on prediction plot volumes, at least 10% of the prediction plots, or a minimum of five, whichever is greater, must be checked.

In order to reject a waste survey on the basis net volume and value, the auditor will audit the number of measure plots specified above within the sample population.

Otherwise, to reject a survey based on the individual parameters, the minimum number of check plots will include both prediction and measure plots. If fewer plots have been audited and there is mutual agreement between the waste surveyor or licensee representative and the auditor, the survey may be rejected.

11.2.2 Field Checking Standards

11.2.2.1 Maximum Allowable Errors

Measurement of a random selection of samples within a waste assessment area is used to assess the acceptability of the survey results. The items to be checked and their acceptable limits of errors are specified below.

11.2.2.2 Net Volume and Value

Exceeding the parameter for either the net volume or net value of waste (avoidable and unavoidable) **of the audited plots** is grounds for rejection of the survey.

Table 11-1 Net Volume and Value

Net Volume	The net volume of waste within a waste assessment area or aggregate population must not vary by 10.0% from the net volume of waste determined by the check surveyor.
Net Value	The net value of waste within a waste assessment area or aggregate population must not vary by 10.0% from the net value of the waste determined by the check surveyor. The net value is derived by multiplying the volume of each species/grade combination by the applicable waste rate.

11.2.2.3 Individual Parameters

Although the net volume and net value are the main determining factors for accepting or rejecting a survey, a survey may be rejected if any of the individual parameters identified below have been exceeded. Additionally, even when the volume and value standards have been achieved within a waste assessment area, if continuous or repeated errors are identified, the District Manager may order a resurvey.

Table 11-2 Individual Parameters

Attribute	Standard
Conifer/deciduous identification	Plus or minus 2.0% of all pieces
Species identification	Plus or minus 5.0% of all pieces
Area (stratum)	A survey may be rejected if stratum areas are incorrect.
Strata identification	No variation allowed
Measure percent	Plus or minus 10.0% percent.
Plot boundary marking	Plus or minus 0.10m (10 cm) when measured on borderline pieces.
Location of plots	No variation allowed (plots must be located in the stratum they were meant to sample)
Count of waste piles	Less than twenty (20) check piles – no variation allowed.
	Greater than or equal to twenty (20) piles - the count must be within 5.0% of the checked number.

Failure to follow the procedures specified throughout this manual may result in rejection of the survey. Some examples are:

1. Incorrect location of plots (not using the correct POC and Grid Spacing Distance),
2. Establishing more plots or less plots than required from the pre-determined sampling intensity,
3. Establishing a plot which samples outside the stratum it is located in,
4. Check surveyor is unable to audit the layout of the plots,
5. Check surveyor is unable to audit the plots and pieces due to poor marking,
6. Using an incorrect method of selecting the piles to be sampled, and
7. Using an incorrect or biased method of determining the prediction volumes.

Appendix 1 Glossary

Words and expressions used but not defined in this Manual, unless the context otherwise requires, have the same meaning as in the Forest Act.

“**AAC**” means Allowable Annual Cut as defined in the *Forest Act*;

“**Act**” means *Forest Act*;

“**Aggregate Waste Submission**” means a waste submission relating to two (2) or more waste assessment areas **and a total population net waste area not exceeding 3,000 ha;**

“**Agreement**” means a form of agreement referred to in section 12 of the *Act*, or a pulpwood agreement;

“**Avoidable Waste**” means wood material that meets or exceeds the Timber Merchantability Specifications that does not fall within the definition of unavoidable waste;

“**Batch**” means a grouping of one or more waste assessment areas selected from a population that have been selected to be surveyed;

“**BCTS**” means BCTS as defined in the *Forest Act*;

“**Bernoulli selection process**” means to sample cutblocks where each cutblock is selected individually for inclusion into the sample, using the same selection probability as in previous batches;

“**Breakage**” means any piece of a tree, meeting the minimum diameter set by the TMS, which has a gross length shorter than 3.0 m in length and is broken at the large end or broken at both ends. This definition is not consistent with the inventory definition of breakage nor is it intended to be;

“**Bucking Waste**” means a portion of a tree or log greater than the top diameter set by the TMS that is less than 3.0 m in length and which has been cut at the large or both ends. To be measured as bucking waste the piece must have originated from a tree or log at least 3.0 m in length;

“**Cardinal direction**” means North, South, East and West. All references to azimuths or bearings mean the “true” value;

“**Char**” or “**Charred Wood**” means wood (not bark) that has been reduced or severely weakened by combustion or extreme heat. Char has a broken or cracked appearance resembling alligator skin;

“**Cold deck**” means five or more grade 1, 2, 4 or 6 (grade 6 is only counted when required to be measured under the cutting authority document) logs that are mechanically placed together in a deck;

“**Conventional**” means any harvest method that does not use a helicopter;

“**Cruise Based**” means a cutting authority where under section 106 of the *Act* the stumpage payable is calculated using information provided by a cruise of the timber conducted before the timber is cut;

2. Dispersed Pile means a pile in which the majority of the pile area (footprint) is located greater than 20 metres from the road edge.

“**POC**” means ‘Point of Commencement’ – a point in or near a cutblock used to locate sample plots or to start a sampling procedure;

“**Population**” means a single item or group of items for which an estimate through the sampling process is made including but not limited to an estimate for a group of cutblocks, sample cutblocks, plots or waste pieces;

“**Primary Logging**” the cutting of timber and the yarding of that timber to a central landing, road side, or drop area in a logging operation;

“**PLC**” or “**Primary Logging Completion Date**” the earlier of the date on which:

- the yarding of all the timber that is cut in a cutblock to a central landing, roadside, or drop area in a logging operation is completed; or
- one month after the date in which the yarding of all the timber that is cut in a cutblock to a central landing, roadside, or drop area in a logging operation is completed for waste assessment areas authorized under the Concurrent Residual Harvest System.
- **The date that the cutting authority authorizing harvest expires, is suspended or otherwise terminated;**
- **It is synonymous with “ready-for-survey”**

“**Reporting Unit**” means a tracking mechanism to store, track and report waste information;

“**Regulations**” means regulations under the *Act*;

“**Ready for Survey**” means the earlier of:

1. The primary logging complete date, or
2. The date that the cutting authority authorizing harvest expires, is suspended or otherwise terminated;

“**Reserved Timber**” means merchantable standing timber left after completion of primary logging within the cutting authority area that is intentionally retained for silviculture, riparian management, biodiversity or forest management reasons. It must be identified as:

1. Areas reserved from harvest on a map submitted by the licensee for waste assessment purposes, and/or
2. Standing timber retained in accordance with a partial cutting regime, or otherwise reserved from cutting, when identified in the cutting authority and appraisal;

“**Residue**” means timber, whether standing or felled, except timber reserved from harvest, which does not meet or exceed the timber merchantability specifications described in this Manual that was not removed from the cutting authority area;

“**Road Permit**” means road permit as defined in the *Forest Act*;

“**Sampling Plan**” contains the waste assessment areas to be reported, the sampling methodology, and the other criteria that will be used to define the sample size;

“**Sample size**” means the number of samples included in a waste survey to meet the objectives of the Sample Plan;

“**Scale Based**” means a cutting authority where the stumpage payable is calculated using a scale of the timber;

“**Scorch**” or “**Scorched Wood**” means wood that is discoloured but wood fibres are smooth and there is little burn penetration into the wood. Scorch may also be used to describe fire damage where the bark is burnt but not the underlying wood;

“**SPIF**” (Starting Point Interval Factor) means a value determined on a monthly basis by the Ministry to be used by agreement holders to generate a random starting point for sampling grids. The SPIF will be randomly determined at 10% intervals ranging from 10 to 90%;

“**Slab**” means any non-round piece of timber that has fractured along a plane roughly parallel to the longitudinal axis of the original log that has a minimum thickness of 10 cm for at least 3.0m of its length and an average diameter equal to or larger than the TMS diameter;

“**South Area**” means Cariboo, Kootenay-Boundary and Thompson-Okanagan Regions;

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

“**Stub (Stubbed) trees**” means the practice of harvesting or removing a portion of the tree so that part of the bole (stem) above stump height remains;

“**Stump**” means any piece of timber in which more than one half (1/2) of its original diameter is remaining, is less than 3.30 m in length and which has a cut top and is still attached to the roots;

“**Survey date**” means the date the field survey started on a waste assessment area.

“**Tie point**” means a falling corner. A specific point on the ground whose location is readily identifiable on a digital image, aerial photograph or map (i.e. road intersection, corner of a field or swamp, field located station) may be used if agreed to by the District and surveyor;

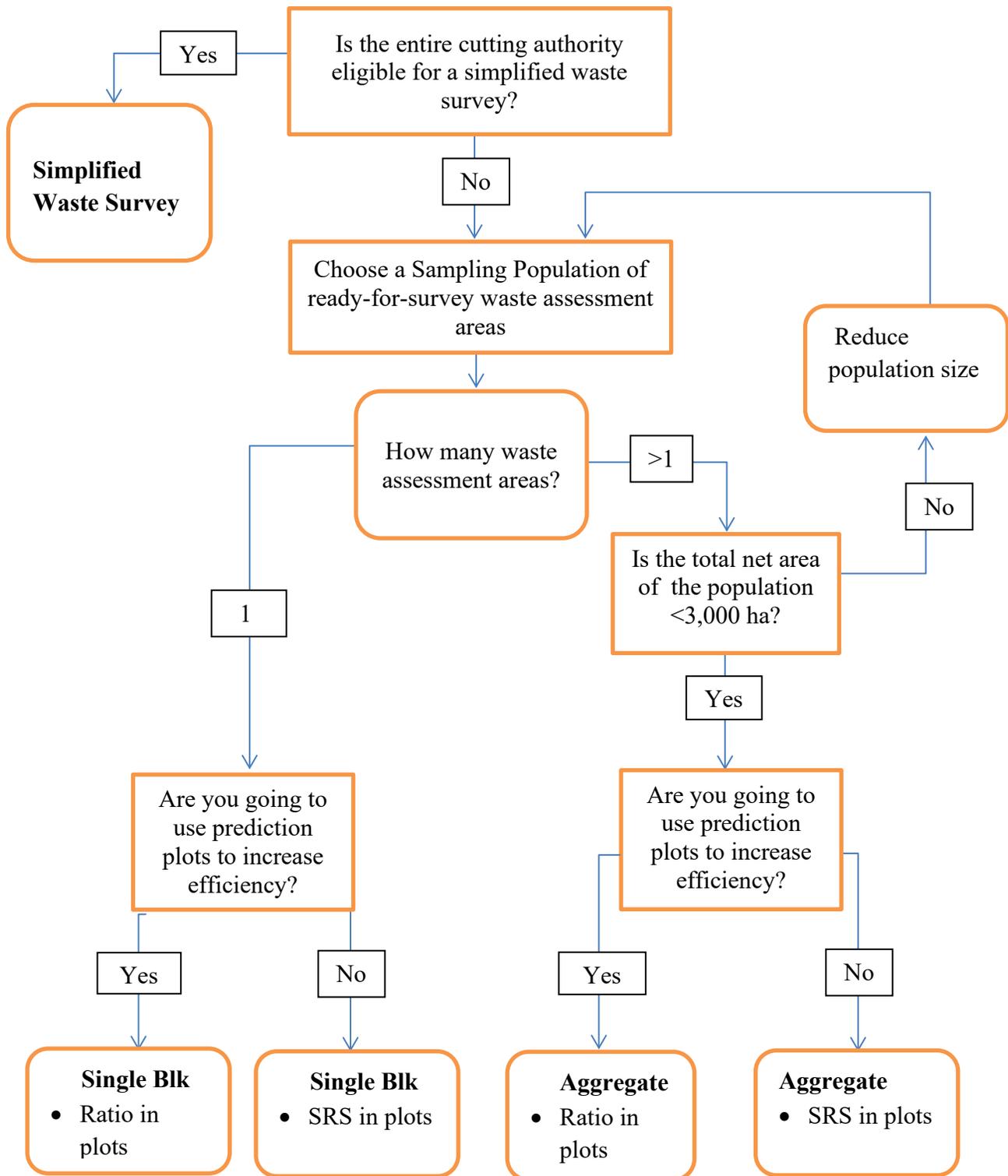
“**Timber Merchantability Specifications or TMS**” means the stump height and diameter, log top diameter, slab thickness and log length specified in this Manual;

“**Timber Pricing Branch or TPB**” means the Timber Pricing Branch of the Ministry;

“**Timber Pricing Branch website**” is:

<https://www2.gov.bc.ca/gov/content/industry/forestry/competitive-forest-industry/timber-pricing/forest-residue-waste>

Appendix 3 Sampling Population Flowchart



Appendix 4 Plot Planning Tables for Single and Aggregate Populations

Dispersed Strata - 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	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) Strata - 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 Stratum Area (ha)	# 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 122 Waste and Residue Post Harvest Certification - Interior

Date:

Cutblock:

Reporting Unit:

Timber Mark:

Initial Appraisal ECAS ID:

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: