



FOREST INVESTMENT PROGRAM

Underplanting Guidance

September 2026



BRITISH
COLUMBIA

Ministry of
Forests

Purpose

This document is to help Forest Investment Program (FIP) delivery partners plan and implement underplanting projects in wildfire affected areas.

In the context of this guidance, underplanting is defined as the establishment of seedlings beneath a fire-killed mature overstory. This definition does not include planting an immature free growing plantation that was killed by wildfire or planting beneath a live overstory. This distinction is made because the aim is to capture forest conditions where fire-killed trees materially influence safety, microclimate and regeneration dynamics. These conditions require a different planning and implementation approach to ensure successful projects.

While it would be ideal to offer specifics on exactly when these stands are safe to work under with minimal hazard mitigation, the diversity of stand types and climate combined with variable weather patterns and decay processes make any attempt at a rule-based model impossible. Instead, this document provides a framework for managing these projects that can be applied across British Columbia with the ultimate focus on workers’ safety.

Contents

1	Definitions	2
2	Benefits to forest values of underplanting.....	2
3	Silvicultural benefits of underplanting.....	3
4	Fire hazard considerations.....	3
5	Managing safety	4
6	Tree and stand stability over time	5
7	Underplanting project phases.....	6
8	Summary	9



For more information, scan the QR code or check out the [FIP Website](#).

1 Definitions

“**danger tree**” means a tree that poses a hazard to a worker due to its location, lean, structural defect, overhead condition, or deterioration of limbs, stem, or root system. Trees are assessed in accordance with the [Wildlife/Danger Tree Assessors Course Workbook – Forest Activities Module](#).

“**level of disturbance (LOD)**” means the classification of work activities based on the level of disturbance to trees and the associated level of risk to workers. Activities are categorized as LOD 1 (low), LOD 2 (medium), LOD 3 (high), and LOD 4 (very high).

“**no-work zone (NWZ)**” means a clearly marked area where worker entry is prohibited except for hazard mitigation. The default size of a NWZ is 1.5 times the length of the longest dangerous defect.

“**wildlife tree**” means a standing live or dead tree with characteristics that provide habitat value for wildlife.

2 Benefits to forest values of underplanting

Underplanting provides benefits to multiple different forest values compared with no planting or planting after overstory removal. These include benefits to soil conservation, forest hydrology, soil nutrients, atmospheric carbon, and wildlife habitat.

From a soil conservation perspective, underplanting returns forest cover to an area while minimizing additional soil disturbance. The loss of the forest floor from the wildfire increases the risk of large-scale erosion, especially on steep slopes, since the forest floor acts as a protective layer. Retaining the burned trees on site helps to rebuild the forest floor as the stems fall to the ground and decompose. Prompt reforestation restores root strength to the area, which also improves soil stability.

The benefits to forest hydrology and flood risk mitigation depend on many factors such as the scale and spatial distribution of a wildfire in a watershed, and terrain characteristics such as aspect, slope and elevation ranges. In general, tree cover results in snow interception which reduces the depth of snow available to contribute to the spring freshet. Snow that is beneath the forest canopy also melts more slowly than in the open due to less direct solar radiation and wind. Less rapid snow melt can reduce the magnitude of peak flows as the meltwater is released over a longer time period. Where flood risk is a concern following a large-scale wildfire, FIP delivery partners are encouraged to consult with their Ministry of Forests’ regional hydrologist to determine how planting efforts may be most hydrologically beneficial.

Below-ground biological processes are expected to recover faster with underplanting. Retained organic matter allows nutrients on site to be released gradually over time through decomposition rather than being rapidly lost through combustion in burn piles or exported during salvage operations. Woody material also contributes to soil moisture retention and creates microsites as trees begin to fall and interact with the forest floor over time.

From an atmospheric carbon perspective, underplanting provides the greatest net carbon benefits as underplanting avoids emissions associated with overstory removal. The additional benefit is estimated to 160-330 tCO₂e/ha by 2050. Standing and downed fire-killed trees store carbon on site and release it gradually through decay, rather than rapidly during pile burning. Promptly planting sites that are not regenerating naturally increases carbon sequestration rates. For more information, please refer to [Forest Carbon Note 3: Reforestation](#).

For wildlife, the retention of standing snags and downed wood preserves biological legacies that support wildlife habitat. The trees provide nesting sites as well as food for invertebrates which are then preyed upon by other insects, birds and mammals. Some species, such as the black-backed woodpecker (*Picoides arcticus*), prefer recently burned mature forest for their habitat. The burned trees provide nesting sites as well as food from the larvae of wood-boring beetles that become abundant in the tree boles.

3 Silvicultural benefits of underplanting

Retaining standing, fire-killed mature trees provides silvicultural benefits during stand establishment. The residual overstory creates partial shade that moderates post-fire site conditions. This shading benefits seedling establishment by reducing soil surface temperatures, improving moisture retention, and protecting seedlings from heat and radiation stress during the initial years following planting.

The snags also create microsites that offer protection from cattle and frost. The temperature moderating effects at the site-level also occur at the microsite-level. The north/northeast aspect of an obstacle will receive much less direct solar radiation and thus dry out less quickly, and have lower soil surface temperatures. This is especially important on hot and dry sites where moisture is a limiting factor and where prolonged high soil surface temperatures can girdle and kill the seedling. As always, the desired target microsites on any site will depend on the ecosystem, the species being planted, and site limiting factors. For example, moist microsites, such as burnt out root channels, that are not adjacent to an obstacle should also be targeted on dry sites.

As fire-killed trees fall, they continue to provide localized shading at ground level, moisture retention, soil erosion protection, habitat, enhanced microbial activity and soil amelioration over the long term. Anecdotal evidence suggests that the damage to seedlings during this stage is typically minimal. Damage may be more significant where large trees in wetter soil are prone to lifting up a large root mat, such as on the coast, but this could be addressed with different micro-site specifications rather than preclude underplanting.

4 Fire hazard considerations

In most underplanting situations, fire hazards are reduced following wildfire because fine fuels have been consumed disrupting vertical and horizontal fuel continuity. These stands generally remain low hazard until new forest structure develops. While fuel conditions evolve over time and exceptions occur—such as steep terrain, high stem densities, or incomplete burns—fire-killed stands during the underplanting window typically present a lower fire hazard than adjacent unburned forests. Establishing seedlings during this period does not create a near-term fuel hazard; rather, it accelerates recovery of forest values while fuels remain predominantly on or near the ground with limited vertical fuel structure.

5 Managing safety

While there are clear benefits to underplanting, the biggest concern is worker safety. There are common hazards found on underplanting sites that are not present, or are less common, on a typical planting site such as:

- High density of dead standing trees
- Sharp branches or branch stubs
- Slippery ground surface from ash accumulation during the first 2 years post-fire
- Burnt out root channels
- Loose rock on steep slopes

These hazards can be compounded by steep or complex terrain. Underplanting can occur in areas that were not harvested due to operability constraints but are relatively easily planted. This may involve long walk-ins or ATV/UTV-access sites. In these situations, reforestation decisions must balance worker safety, forest management objectives, and an understanding of how hazards are likely to develop over time. Where more hazardous areas are included in treatment units, prescriptions must clearly identify safety constraints, worker limitations, and required mitigation measures.

The standing dead stems are the most consequential hazard that must be addressed throughout all phases of a project. Section 7 discusses actions for each project phase on how to manage this hazard. The following is an overview of danger tree assessments; the main tool used for managing safety in underplanting stands.

Danger tree assessments

The [Wildlife Danger Tree Assessment](#) process is the established method in B.C. for identifying dangerous trees and implementing the steps to ensure worker safety. This process is applicable to all forest activities. Further information on the assessment and accreditation process is available at the link provided. An example danger tree assessment report is provided in Appendix A.

Though planting contractors are familiar with this process and have accredited assessors on staff, not all contractors have staff that are experienced in doing danger tree assessments on fire-killed mature timber. Inexperience can lead to overcalling danger trees or insufficiently covering the site and missing danger trees. Therefore, setting and communicating expectations to contractors early is important.

Danger tree mitigation

When a danger tree is identified, either a no-work zone (NWZ) is ribboned out around the tree, or the tree is felled. Which option is chosen depends on the personnel available, site/stand conditions, and the density of dangerous trees on site. Not all contractors will have certified fallers to fall dangerous trees. NWZs are the cheapest and safest method of mitigation when implemented properly. NWZs also maintain the wildlife value of standing dead stems, which may be of particular importance for rare large-diameter stems.

As the dead-standing stems age and decay advances, the number of dangerous trees per hectare may make NWZs impractical as a significant amount of area will be removed and it becomes difficult for planters to safely and effectively navigate the NWZs. At this stage falling becomes the most effective method. Stands that require extensive danger tree falling should be considered no longer suitable for

underplanting and should be avoided. Determining this threshold requires some judgement, but falling in excess of approximately 20 stems per hectare should raise questions about overall stand stability and the decision to underplant the site.

Assessments for tree planting are valid for wind speeds up to 40 km/h by default. For higher risk stands, assessors may deem a stand is safe for planting only at a reduced windspeed threshold. Reducing the threshold to 20 or 30 km/h is common.

Personal protective equipment

Under the [Occupational Health and Safety Regulation \(OHSR\) 8.11](#), workers are required to wear safety headgear where it is not practicable to eliminate the risk of head injury. Safety headgear must meet the requirements described in OHSR 8.11 subsection (2).

For tree planters the ideal safety headgear meets the OHSR standards but also has ventilation and a chin strap. The physical intensity of tree planting exceeds that of other forestry fieldwork activities with planters often working in direct sunlight. Traditional hard hats are not recommended for planters because they increase the risk of heat exhaustion on hot sunny days. They are also more likely to fall off while planters are bending over, which is especially an issue on steep slopes.

High visibility apparel is also recommended so that workers can be easily spotted by crew supervisors.

6 Tree and stand stability over time

Following a wildfire, tree stability declines over time as environmental factors interact with the work of decay organisms to weaken the structural integrity of the stem and supporting roots. They may fail at the roots or any position along the stem. Rates of deterioration vary by species, diameter, wood density, climate, soil moisture, and pre-fire health, but some broad patterns are consistent. Often, stands exhibit cohort instability where many trees become unstable over a relatively short period — storm or wind events are the primary driver leading unstable trees to break and fall to the ground.

Key considerations:

- Mature broadleaf stems typically deteriorate rapidly beginning 3–5 years post-fire
- Smaller-diameter (approximately 12.5 cm to 17 cm DBH) mature conifer stands typically deteriorate 4–6 years post-fire
- Larger-diameter conifer stands deteriorate around 7 years post-fire
- Wet sites and moisture receiving pockets can succumb to windthrow in the first few years post-fire before stems start to deteriorate

Understanding how and when trees are likely to become unstable is therefore critical to deciding when sites should be assessed and treated, how long they are likely to remain safely operable, and whether underplanting remains feasible before conditions transition from manageable risk to unacceptable hazard.

7 Underplanting project phases

There are steps at each phase of an underplanting project to set up field workers to be able to do their jobs safely. Project managers cannot rely solely on danger tree assessments at the time of planting. The following outlines the typical phases for underplanting projects:

- Wildfire review
- Determine priorities for reforestation
- Eligibility assessments
- Planting layout
- Tendering, viewing, and contracts
- Planting and implementation
- RESULTS reporting

Wildfire review

Wildfires now routinely exceed the scale at which site-by-site field review is efficient. To support coordinated recovery, FIP delivery partners are encouraged to use a wildfire review process to identify what burned, characterize burn severity, and separate affected landscapes into manageable planning units. This process provides a consistent, landscape-level foundation for management discussions, prioritization, and subsequent field assessments. For more information please see the [Post-Wildfire Assessment Overview Guidance](#).

For underplanting this means assessing the data to determine the potential quantity of underplanting in the fire perimeter and the stand types. This information can be used in the next phase to help determine timelines and the scale of effort required to meet reforestation objectives safely.

Eligibility assessments

Eligibility assessments are the initial field assessment to determine if an area is suitable for treatment. They are a distinct field activity from silviculture surveys, though there is overlap. The information and data collected during an eligibility assessment is more akin to the field work for site plan development where correctly delineating and mapping different site series and pre-fire stand types is necessary to inform management decisions.

Assessments need to identify different treatment units, non-productive areas or other areas to be excluded from treatment, site limiting factors, safety hazards, access considerations, current stocking, natural regeneration potential, forest health risks, and any other forest management issues. It is therefore recommended that eligibility assessments are conducted/reviewed by silviculturists with experience in this type of work to ensure that treatment regimes are appropriate for site objectives and ecology. Please refer to the [FIP Post-Wildfire Eligibility Assessment and Survey Standards](#) for more information.

Eligibility assessments must consider the silvicultural benefits of underplanting the stand. Is this a site that would be difficult to regenerate if the moderating influence of the dead overstory is removed? Are there microsite benefits created by the standing dead? How does this influence the species mix prescribed?

From a danger tree assessment perspective, field reviews are defined as “very low risk” activities and do not require a danger tree assessment. However, all personnel should receive a pre-work safety orientation addressing site hazards and how they may change under different conditions.

The pre-work should also include a discussion on how field staff can make an estimate of the potential danger trees per hectare. This can be as simple as discussing the LOD1 criteria so that field staff can get a sense of what to look for. The goal at this stage is to get a general idea of the stand condition and how it may evolve during the time before planting.

Important data to be collected for underplanting eligibility assessments

- Description of pre-fire stand including species mix, and height and diameter distribution
- Current state of standing dead and estimated danger trees per hectare
- Plantable spots by micro-site type, if applicable, to inform the prescription’s species mix
- Estimated area within a treatment polygon not suitable for treatment
 - o E.g. high-risk danger tree areas, severe blowdown, non-productive, broadleaf patches, rocky outcrops, wetlands. Often these areas are too small and dispersed to map and ribbon out efficiently
- Outline of access needs for planter and tree delivery
 - o Does the terrain permit ATV/UTV trails?
 - o Will a helicopter be required for tree delivery or planter access?

Planting layout

Planting treatment area layout is recommended to be completed in the season preceding planting to ensure treatment boundaries remain identifiable at the time of implementation. In burned areas, ribbons deteriorate quickly, become obscured, or are lost as marked trees fall, making boundaries easy to miss.

Layout also provides an opportunity for a final site assessment. Danger tree hazards and natural regeneration stocking can change significantly from the time eligibility assessments and sowing are completed to when trees arrive on site. Addressing these changes before planters arrive reduces the need for mid-operation boundary changes, minimizing cost, logistical disruption, and safety risk.

Tendering, viewing and contracts

Starting with the tendering and viewing phase, there must be clear communication with planting contractors about the underplanting sites in a project. Contractors should have a very clear understanding of the type of sites they will be bidding on, and the expectations and contract requirements that differ from more standard planting projects.

A simple open tender is not recommended for planting contracts that include underplanting. An Invitation to Tender (ITT) with mandatory requirements or a Request for Proposal (RFP) provides more control to ensure that prospective contractors are able to deliver the project safely.

A mandatory viewing meeting should be held for all prospective contractors prior to receiving tender packages. The focus of the meeting should be on the unique safety conditions of the sites in the project. This includes access and logistics which strongly impact planter safety. Discuss emergency

response plans, personal protective equipment (PPE) requirements, and discuss the danger tree assessment and mitigation requirements in detail.

Provide access maps and a summary sheet with opening type (i.e. underplanting or not), block directions, and additional access comments. Additional access comments should provide information on in-block tree delivery. Often underplanting sites require ATV/UTV trails for tree delivery. The summary sheet will help contractors focus their field viewing on the sites that are the most complicated or require the most DTA work, as well as give a good overview of the project.

It is recommended to include a danger tree assessment specific schedule in the planting contract. Planting contracts often contain only one short paragraph on DTA requirements that lack specifics on requirements and expectations. Including a specific schedule highlights the importance of DTA work for the project. It is recommended that the DTA work is not tendered as a separate contract. Planting contractors should not have to rely on another contractor's work for their workers' safety.

Planting and implementation

As part of the pre-season office pre-work, discuss the contractor's danger tree assessment plan. Communicate any plans for snow plowing roads, if applicable. Remind the contractor that trees assessed and marked as safe must be reassessed if an intervening winter or disturbance event (e.g. windstorm, ice storm, fire) has occurred before the work activity has commenced.

The contract implementor must play an active role in monitoring the completeness and quality of the danger tree assessments and reports. The danger tree assessment for the first site should be reviewed prior to the first tree being planted. Once the first few are noted to be correct; the remainder can be collected with the planting deliverables. If a contractor is hired for implementation, ensure that these responsibilities are identified in the contract.

Throughout the project, field inspections by the implementation staff should include attention to the quality and effectiveness of the danger tree assessments and mitigation work. For example, if planters are regularly planting through NWZ then this needs to be discussed with the planting contractor.

Once safety is well-covered, implementation staff should make sure that the underplanting specs for microsite selection and spacing are being achieved by the planters. Treatment units with reduced minimum inter-tree distances and variable spacing may require extra attention to ensure that planters are meeting the specs and not defaulting to more standard spacing.

RESULTS reporting

All planting activities, including underplanting treatments, must be reported in the provincial silviculture database (RESULTS) in accordance with the [Results Information Submission Specifications \(RISS\)](#) for government-funded activities, Forest Investment Program. Areas where no treatment or further monitoring is recommended must still be reported—forest cover and stocking standards do not apply in these cases.

Underplanting has a distinct RESULTS activity method code: UNDER

Where treatment areas contain a mix of underplanted and non-underplanted conditions, appropriate stratification is required so that activities are reported separately. Accurate underplanting reporting is important as these treatments are tracked by the Forest Investment and Reporting Branch. This tracking supports the evaluation of long-term growth and survival outcomes relative to other post-fire reforestation approaches.

Having units identified as underplanting in RESULTS also provides information on danger tree hazards for future activities such as fill plants or monitoring surveys. Adding opening comments that provide an update on the danger tree hazard is useful for planning and future field work.

8 Summary

Experience has shown that the optimal window for underplanting fire-affected stands occurs within the first six years following a wildfire; while reforestation is still possible beyond this period, operational difficulty and safety risks increase substantially over time.

In consideration of worker safety, seedling survival, and broader forest management objectives, FIP encourages timely reforestation within wildfire-impacted areas where conditions are suitable.

Underplanting should be approached as an iterative process, requiring repeated evaluation from prescription through implementation to confirm that site conditions remain appropriate, recognizing that stand stability and safety conditions evolve as fire-killed forests continue to deteriorate.

Successful underplanting projects require clear communication, proactive safety management and teamwork between project managers and contractors.

APPENDIX A

Sample danger tree assessment report

DANGER TREE ASSESSMENT REPORT

Block: CCF28

Assessment Date: May 8, 2026

Pre-Inspection

Prior to commencing field activities, a pre-work briefing was conducted to review potential hazards, safety protocols, radio communication channels, and designated emergency muster points. All personnel involved in the assessment were informed that work would be conducted under a Level of Disturbance 1 (LOD 1) assessment. The assessment methodology, including tree stability testing procedures, was reviewed prior to commencing work.

Inspection

Block CCF28 is comprised primarily of mature, fire-damaged standing fir averaging approximately 20 to 30 metres in height. A significant component of immature fir, ranging from 10 to 20 metres in height, is also present at an estimated density of 50 to 200 stems per hectare. Additional deciduous species occur periodically throughout the block.

Observed defects include broken tops, partial top loss, secure snags, matchstick blowdown, and stem deterioration resulting in reduced sound wood cross-section. No evidence of recent blowdown was observed. The majority of structurally weaker trees appear to have failed naturally prior to the assessment. Remaining standing trees were evaluated and found to be stable for the intended work activities.

Mitigation

All workers should receive a comprehensive site-specific safety briefing to ensure understanding of ribbon colour designations, danger tree hazards, No Work Zones, and emergency procedures. Appropriate PPE shall be worn at all times while operating within the block.

Wind conditions shall be monitored throughout operations. Workers must be familiar with designated muster points and evacuation procedures. Work activities shall cease if wind speeds exceed 40 km/h.

Following inspection of the block, the Danger Tree Assessment Team identified two danger trees. These hazards were marked with orange No Work Zone ribbon, and access trails were flagged with pink ribbon.

Conclusion

Based on the assessment findings and mitigation measures implemented, the Danger Tree Assessment Team has determined that the worksite is acceptable for planned operations, provided wind speeds remain below 40 km/h and all identified controls are maintained.

Assessor: Jeff Brush

Certification #: FA5155

Signature: Sample

Date: May 8, 2026

Danger Tree Assessment

BLOCK: CCF28		DATE: May 8, 2026	
ACCESS (Circle all that apply):			
4x4	<u>QUAD</u>	WALK-IN	KMS HELI
DANG TREE PRESENT: No work zone established in orange ribbon pinned on map			
DANGER TREES FALLEN: 0		FALLER: 0	FALLER CERT: NA
NO WORK ZONES ESTABLISHED ☐ As indicated on Wildlife Danger Tree Map attached ☐ None established		AREAS OF POSSIBLE CONCERN IF WINDSPEED >40KM/HR (Refer to Beaufort Scale) ☒ While working along the treeline ☒ While working along or in any reserve areas	
CREEK CROSSING & BRIDGES ☐ Planks required to cross ☐ Bridge needs to be built ☐ Bridge in place ☒ No Issues		HAZARD MANAGEMENT PLAN: LOD 1 - No work zone in orange ribbon pinned on map (Northern part of the block) - Evacuate to roadside during high wind events - Common faults: matchstick, blown down, broke tops - Wear proper PPE	
WLDT ASSESOR #		FA5155	
NAME:		Jeff Brush	
SIGNATURE:		<i>Sample</i>	
WIND SPEED	DESCRIPTION	LEVEL OF DISTURBANCE EQUIVALENCY	
<20 km/hr	Dust & loose paper raised, small branches move	1 (low)	
20-40 km/hr	Strong breeze, large branches in motion	2 (medium)	
40-65 km/hr	Needles & small branches fly in the air	3 (high)	
55+ km/hr	Twigs broken off trees, whole tree in motion, inconvenience felt when walking against the wind	4 (very high)	

DTA Report for Planting Unit CCF28, May 8th 2026

