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RECLAMATION GUIDELINES

BFU/LLYK

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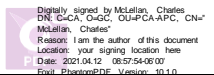
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Approvals

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Scope

The intent of these guidelines are to help proponents (internal and external) better plan successful terrestrial reclamation actions within Banff, Yoho and Kootenay National Parks. As these parks are managed in two distinct field units (Lake-Louise-Yoho-Kootenay (LLYK) and Banff (BFU)) there are field unit specific guidance and resources provided throughout this document (Figure 1).

Reclamation and restoration are often used interchangeably but are two distinct activities.

The goal of reclamation is generally to return lands to equivalent land use through stabilization of the site and establishing vegetation that is suitable for the project location (invasiveness, aesthetics, Wildsmart and FireSmart are considered). Reclamation planning is a process that requires site-specific considerations. These guidelines provide options for projects and are not prescriptive in nature. Proponents should include the vegetation specialists in early project conceptual discussions (including Project Description development).

Restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed. Restoration projects (with the end goal of establishing functional habitat) are more dynamic in nature, and while the majority of the following guidelines apply, each project will be reviewed as a stand-alone to ensure restoration success (restoring ecological integrity).

These guidelines are not to be mistaken with “approved” actions; they are to be used to properly scope reclamation components of a project and give a general idea of our preferred methods. They should not be considered the only methods that would be approved if proven alternatives are desired. These guidelines are not a Best Management Practice nor in any way do they eliminate the need for proponents to follow normal approval processes, however if these guidelines are applied well, such approvals should proceed more quickly and with fewer revisions.

In Scope	Out Of Scope
Reclamation planning (disturbed sites)	Restoration planning (impacted ecosystems)
Non-native vegetation management	Soil import <i>See BFU Soil Movement and Sourcing Guidelines (under development)</i>
Earthworks (as related to topsoil and vegetation establishment)	Vegetation and woody debris management <i>See BFU LLYK Woody and Vegetative Debris Management Guidelines 2019</i>
Revegetation Methods	Erosion and sediment control planning
Soil amendments and hydro mulch	Contaminated soil management
Monitoring and maintenance of reclamation projects	Species at Risk planning considerations and details <i>See Impact Assessment Process</i>
Definitions of qualified environmental professionals	Aquatic restoration, riparian specific considerations

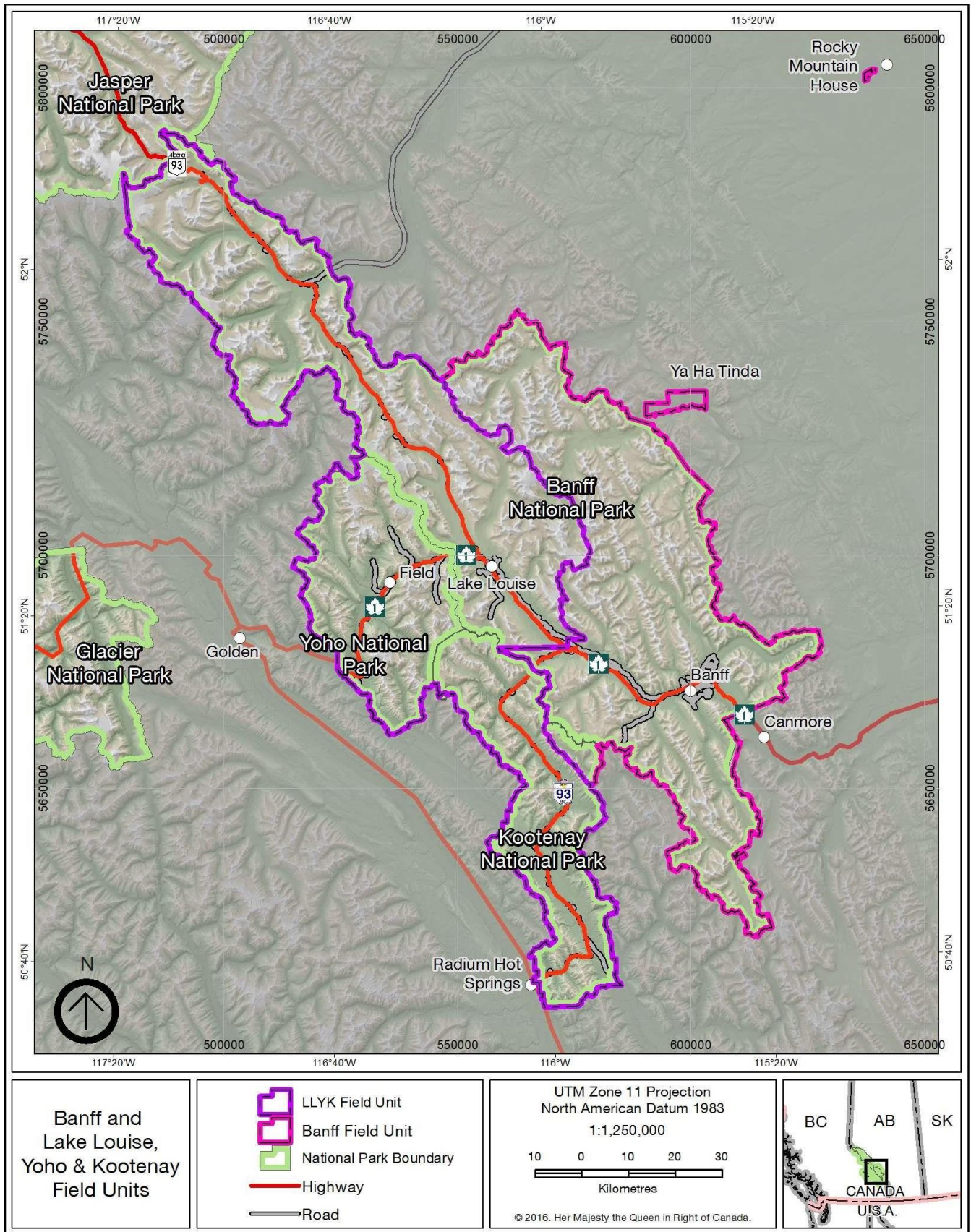


Figure 1: Banff and Lake Louise, Yoho & Kootenay Field Units

Section 1: Reclamation Planning

Principles

1. Any ground disturbing project requires a reclamation plan with components of the minimum standard listed below. Additional sections may be required depending on the complexity of the project.
2. It is understood that reclamation plans may be built into other project documents (project descriptions, environmental assessments, environmental protection plans) or as stand-alone documents depending on project size and complexity.
 - The environmental surveillance officer (ESO)/vegetation specialist may request a standalone plan if essential reclamation activities are unclear in project documents or if the project is large in scope.
3. Regional migratory bird windows, bats windows and other Species-At-Risk consideration will be assessed and documented through the Environmental Assessment review process.
4. These guidelines do not supersede any requirements of Environmental Assessment, permits, area closures, restricted activity orders, etc.

Considerations

Disturbance: In all cases, minimal disturbance is desired where disturbance cannot be avoided. In order to achieve minimal disturbance rig mats, low pressure tires, low impact machinery and frozen or snow covered conditions may be required for project delivery.

Timing: Reclamation needs to be considered early in project development to ensure its success. Reclamation has distinct windows where activities are successful and projects should plan accordingly. Planting and seeding should only occur in spring/fall (see [Section 5](#)), earthworks must occur in non-saturated conditions (typically after June) and off-road access should occur under frozen ground conditions.

Sensitive Sites, Riparian and Undisturbed Sites: Non-ubiquitous ecotypes require additional assessment (directed through the impact assessment process) this may include Rare Plant Surveys completed by a qualified environmental professional (see [Appendix A: QEP](#)), aquatic receptor monitoring and erosion mitigations.

Vegetation of Special Concern in BNP

- Whitebark pine (*Pinus albicaulis*) is a SARA (Species at Risk Act) listed Category I species. Removal or destruction of critical habitat requires SARA authorization in accordance with the Species at Risk Act
- Limber pine (*Pinus flexilis*) is a COSEWIC and provincially (AB/BC) listed endangered species. For the purpose of this document, Limber pine should be dealt with in the same manner as Whitebark pine.
- Mature, large diameter Douglas-fir and Rocky Mountain Juniper removal requires approval from the Vegetation Specialist as they are considered special resources in the Banff Field Unit.
- Foothills rough fescue and Bluebunch wheatgrass grasslands are sensitive features and work in or adjacent to them requires consultation with vegetation specialists.
- Rare plants can be found at any location within the Park (including roadside, disturbed areas).

Resources: Reclamation planning and implementation should be undertaken by qualified environmental professionals (see [Appendix A: QEP](#)) when the project is large or complex. For small disturbance areas these guidelines and resources below should be used to properly engage the review process.

- Reclamation consultants and contractors, including landscapers and nurseries.
- City of Calgary Habitat Restoration Framework
 - <https://www.calgary.ca/content/dam/www/csps/parks/documents/construction/habitat-restoration-framework.pdf>
- Grassland Restoration Forum – resources on minimizing disturbance footprints and recovery strategies within the montane.
 - <https://grasslandrestorationforum.ca/information-portal/>

Activity Standards

Reclamation Plan (minimum standard)

1. Non-native vegetation management (including prevention; see [Section 2](#))
2. Topsoil management (including soil salvage techniques; see [Section 4](#)) and import (if required)
3. Revegetation methods (including species selection; see [Section 5](#)) as directed by pre-site conditions.
4. Monitoring and Maintenance (see [Section 8](#))

Section 2: Non-Native Vegetation Surveying and Management

Principles

1. Prevention of NNV import and establishment is the most important action in Integrated Pest Management
2. All ground disturbing projects must budget for NNV surveying, control and monitoring – regardless of pre-disturbance site conditions.
 - In many cases pre disturbance NNV surveys are required
 - In many cases post-construction NNV control is required.
3. Employing more than one control method is encouraged under the principle of integrated pest management.
4. Proponents are not responsible to eradicate NNV that is already present prior to disturbance but must monitor and control to ensure the NNV does not increase in abundance or diversity.

Considerations

Plant Phenology (life stages): Invasive management actions depend on the plants life stage. Generally chemical control is used in rosette and bolt stages. Mechanical control is used when plants are bolting and developing flower heads. Once foreheads and seed head develop, control actions are much less effective and slower (as flower/seed heads need to be removed prior to control). Therefore, it is in the projects best interest to control prior to flower head development. Changes to project delivery dates affect the type of control that is required and must be considered when these changes are made.

Resources: There are ample online resources that provide a variety of control option for each species. These resources should be reviewed and incorporated into project planning and reviewed by ESO/vegetation specialist. A NNV Management template is provided in [Appendix C](#)

- Known NNV distribution, field unit ranking list and field unit control guides are all available through the ESO/vegetation specialist – these documents are updated annually.
- Alberta/ Invasive Species Council – Factsheets
 - <https://abinvasives.ca/invasive-species/fact-sheets/>
- Invasive Species Council of British Columbia – Factsheets
 - <https://bcinvasives.ca/resources/tips/>
- Environmental Consultants and Landscaping Companies

Chemical Control Requirements

- Only herbicides approved in the applicable field units' Integrated Pest Management Plan (IPMP) are to be used.
- All chemical application must be completed by a Certified Applicator (AB or BC license) or Assistant Applicator (as per regulations).
- All chemical applications require an approved Restricted Activity Permit
 - This permit must include the applicators license number, desired herbicide to be used and map of locations to be controlled.
- All applications must adhere to
 - Alberta Regulations
 - Environmental Code of Practice for Pesticides
 - Pesticide Sales, Handling, Use and Application Regulations
 - British Columbia Regulations
 - Integrated Pest Management Act and Regulations
- All records must be submitted to ESO within 2 weeks of application
- Spot spraying is the only application method approved for use without an additional Basic Impact Assessment.

Disposal: Vegetation debris (rosettes, stalks, leafs etc.) generally can be disposed anywhere that yard waste is accepted (or left on site, if appropriate). Flowers, seed heads and seeds must be disposed to ensure seed is not dispersed to new areas – this may include burning or disposal at a landfill (nature of waste must be disclosed to landfill operator).

Activity Standards

2.1. NNV Survey

1. A qualified Environmental Profession ([Appendix A](#)) should be provided total project area to survey, including on and off site staging areas (associated area at pits).
2. Survey must be completed during growing season (June-August)
3. Surveyor must document species, phenology and size (m²) with referenced points or polygons, ideally on a map.
 - [Appendix C](#) can be used to document identified species.
4. Survey must be provided to ESO within 2 weeks of completion.

2.2. Mechanical Control

1. Flower/seed head removal is required before mechanical control if they are present on plants – this is to ensure seed is not dispersed across the area before damaging plants. Flower/seed heads should be carefully removed from plant (minimizing number of seeds that are release) and placed into paper bags, labeled and properly disposed (see consideration above)
2. Generally mechanical control includes
 - Whack/mow: Using hand tools/power tools (brush saw, weed whackers) to sever the aboveground portion of the plant. Ensure to mow as close to the base as possible, avoiding native vegetation if possible. If flowers/seed heads are not present debris can be left on site (generally).
 - Pull: Using hands/hand tools – soil type will dictate the ease of this method, some species require substantial root remove to be effective, do not continue pulling if not achieving appropriate root removal.
 - Dig: Using hand tools – to remove the majority of root mass. All areas that are dug should be re-seeded using adjacent topsoil or purchased seed (site specific).

2.3. Chemical Control

1. Only certified applicators complete chemical control and shall complete all action as per applicable regulations once approval has been granted (see above considerations)
2. If flower heads/seed heads are present they must be removed prior to chemical application.

Section 3: Sod Salvage

- The *BFU/LLYK Woody Vegetative Debris Management Guideline 2019* covers all aspects of vegetation removal.
 - Sod salvage is omitted from the above guidelines and therefore is included below.
- Consider what woody debris can be salvaged for use in reclamation (see Section 4: surface preparation).

Activity: Sod (vegetation mat) Salvage

Considerations: Sod stripping should be completed in all areas where mats of vegetation exist as it is the most effective and successful method of restoring disturbed areas. This can be accomplished by using a sod stripping machine or by hand on smaller areas. Salvage ground cover vegetation, including grass, forbs and the root layer immediately above the topsoil layer, in areas where ground disturbance is required. Sod should be comprised of 50% or more vascular plant species and established root structures before vegetation sod salvage and transplantation should be attempted.

3.1. Sod Salvage

1. Clearly mark areas for sod salvage to avoid additional disturbance.
2. Remove sod any shape that is manageable (typically squares), hand cut by shovel or with clean-up bucket of excavator, on a level plane below the root, and maintain a consistent depth of 10 to 15cm.
3. Use hand crews to assist the excavator to remove sod blocks with cutting and storage of sod. Gather loose soil and root material to be retained with sod.
4. Do not bend or roll sod blocks and minimize the amount of handling.
5. Storage
 - a. Store sod flat, on flat ground or pallets or wood sheeting. Sod must be stored with vegetation facing upwards (e.g. not facing the ground).
 - b. Sod mats may be stored in a pile, provided that each layer is placed with grass blades facing upwards.
 - c. Place salvaged sod in low profile (<60cm in height) windrows with the appropriate erosion control for rain and windy conditions, in a weed free area for storage designated by the Vegetation specialist/ESO.
 - d. Cover sod with a white, breathable geo-textile fabric to protect from precipitation and sun and stack sod blocks.
6. Re-plant sod as soon as possible while keeping stockpile moist in dry weather without over-watering, wet sod may compost.

Section 4: Earthworks – excavation, storage and surface preparation

Principles

1. Topsoil will be conserved through
 - Effective erosion and sediment control planning and implementation
 - Minimizing soil movement and handling to protect existing native seed bank.
 - Only working in dry conditions
 - Being used in reclamation/restoration of the site it originated (preferably) or at other sites in the field unit.
 - Topsoil will not be removed from the park or landfilled unless contaminated.
2. Soils will not be admixed (topsoils and subsoils will remain separate) through project delivery.
3. Locally sourced topsoil is desired in all cases, even when volumes are limiting.
4. Coarse woody debris (CWD) is recommended.
5. Topsoil import will be addressed in the *Soil Movement and Sourcing Guidelines* (under development 2021).

Considerations

General Challenges: Within BFU/LLYK topsoil characteristics can vary considerably and be difficult to separate from subsoil. Topsoil can range from humus-rich, dark-colored A horizons to pale, nutrient-leached A horizons depending on elevation, aspect, slope position and parent material. A summary of challenges for topsoil salvage include:

- thin topsoil (less than 10 cm) and thin or discontinuous organic surfacelayers;
- shallow bedrock (bedrock encountered less than 30 cm from ground surface);
- elevated coarse fragment content greater than 30% of soil volume;
- steep slopes (access challenges);
- a wide range of soil characteristics that can make topsoil difficult to identify in the field;
- elevated erosion risk; and,
- target vegetation that is sensitive to disturbance (e.g., whitebark pine, limber pine).

Excavation and Lifts: Topsoil (sometimes referred to as organic soils) and subsoil (sometimes referred to as mineral soil) are distinct components and need to be managed separately. Earthworks cannot occur in wet, saturated conditions. Any work conducted outside of these periods should identify adequate mitigation measures to avoid additional ground disturbance by heavy machinery (rig mats are preferred). Topsoil depth in Banff National Park varies considerably and can be difficult to separate from subsoils. It is imperative that topsoil is salvaged to conserve the native seed bank. Admixing soil (one lift procedure) will contravene mitigations established under project approvals (Environmental Assessment).

Topsoil Storage: Topsoil will begin degrading immediately after excavation (loosing seedbank, leaching nutrients, digesting and being lost to erosion); the following are storage timeline standards for

- Temporary Storage (<30days) – topsoil loss mitigated through considerations below. Best practice is for topsoil to be stored no longer than 5 days without an erosion mitigation (geotextile, tarps, hydro-mulching etc.), especially on exposed (windy) sites. These mitigations will be addressed in the proponents *Erosion and Sediment Control Plan*.
- Long term Storage (>30days) – Long term storage requires a soil management plan be submitted to the Field Unit for full policy review, unless mitigations are stipulated in an approved -Impact Assessment. Soil management plans may include minimum reclamation plan components ([see Section 1](#)), long term planning (future use) and a full suite of -analyses for record keeping purposes. The assessment criteria for long term storage application will be at the discretion of the respective field unit.

During project planning consider where topsoil can be stored as to avoid being moved multiple times (each move loses 10-25% of the topsoil volume). Store in sheltered areas, separated 1 m from other stockpiles, use appropriate material (e.g., geotextile) to separate soil components where space is limited. Topsoil should be stockpiled on the uphill side of the disturbance on sloped terrain and away from any grades, subsoil's, spoil material, construction activity and day to day operations. Surrounding soil with berms to avoid material loss. Topsoil from separate ecotypes, different areas of the project or different projects cannot be mixed without approval of the ESO through consultation with the vegetation specialist (i.e., grassland soils must be kept separate from forested soils).

Subsoil Storage: Subsoil storage has similar considerations for storage though loss is not as impactful to site reclamation. Storage timeline listed above apply to subsoils storage. NNV invasion of subsoils is the concern.

Contaminated Soil: Contaminated soils will be addressed via the EA Process and may involve Federal Contaminated Site specialists. These guidelines do not address any activities for contaminated soils.

If soil disposal is required, proper manifesting and landfill criteria will be required.

Excess Materials: Occasionally, a project will result in more material than can be used. If so, this material must be moved off the project site and arrangements must be made for disposal or stockpiling for other projects in consultation with the ESO and vegetation specialist. Surplus excavated material may be used to fill depressions within the disturbance footprint provided that topsoil is stripped before filling, with approval from ESO in consultation with Assets/Highway SC. Excess materials should be stored in piles separated by horizon (i.e. topsoil stored separately from subsoil).

Weather Changes: In the event of a work program shutdown during inclement weather (e.g. winter conditions unfavorable for construction, heavy rain events, construction delays, etc.) contingency planning for bare soils or excavated material stockpiles is required.

Decompaction: Soils that are compacted do not allow moisture to flow through them, causing issues with saturation and drying. Hard-packed soils must be decompacted to ensure vegetation establishment. Largely this is accomplished by hand (for trails, informal staging areas, etc) and by harrow or other machinery for larger areas.

Coarse Woody Debris (CWD): CWD provides microhabitats that improve abiotic and biotic site condition. CWD “pieces” should be composed of a wide range of sizes (average diameter 10cm, average length 2m) and tree species reflective of the over story. It should be applied in a patchy distribution and properly keyed into the soils (see below).

Table 1: Permitted CWD Volumes as per *BFULLYK Woody and Vegetative Debris Management Guidelines 2019*

Cover Type	CWD pieces/ha
Hardwood	40
Mixedwood	60
Softwood	110

Resources:

- Rough and Loose (if requested)
 - https://www.cdmpportal.ca/sites/default/files/2020-02/Making_Site_Rough_and_Loose.pdf
- General best practices for soil management in native grasslands
 - <https://grasslandrestorationforum.ca/wp-content/uploads/2018/04/Recovery-Strategies-FF-FP-MON-First-Approx-Revised-April-2018-SECURED.pdf>
 - <https://open.alberta.ca/dataset/dbbc914c-a2f7-4df9-8b28-979459883f17/resource/5070c720-58e8-4a1d-baed-256727449611/download/2016-principles-for-minimizing-surface-disturbance-in-native-grassland-september-1-2016.pdf>

Activity Standards

Activity: Excavation

4.1 Excavation

1. Excavations must occur in 2 or 3 lifts.
 - a. Two Lift (common)
 - i. Lift 1 (topsoil; O and A horizons)
 - ii. Lift 2 (sub soil; B and possibly C horizons)
 - b. Three Lift (in sensitive areas)
 - i. Lift 1 (organics; O horizon)
 - ii. Lift 2 (topsoil; A horizon)
 - iii. Lift 3 (sub soil; B and possibly C horizons)
 - c. If unable to complete desired lifts, ESO must be contacted before moving forward. Consider using a spotter to ensure heavy equipment is calibrated to the lifts of the project area.
2. Soil stockpiles must ensure these lifts are not mixed and best practice is to maintain 1m spacing between stockpiles.
3. If topsoil/organics is being stored for more than 5 days, cover with tarps or geotextile to reduce soil loss.

4.2 Temporary Storage

1. Prepare all components and materials of Erosion and Sediment Control Plan (or Environmental Protection Plan) prior to stockpiling soils.
2. Locate stockpiles as per considerations above, and approval of the ESO.
3. Topsoil stockpile will not exceed heights greater than 2 m. Subsoil piles may be larger with the approval of ESO.
4. Topsoil that is to be stockpiled for longer than 5 days must mitigate soil loss by protecting, covering, hydro-mulching, seeding or other measures as per Erosion and Sediment Control Plan.
 - a. If covers are to be used; they should prevent light penetration (dark-coloured tarp) and be anchored to prevent erosion and wildlife entrapment.

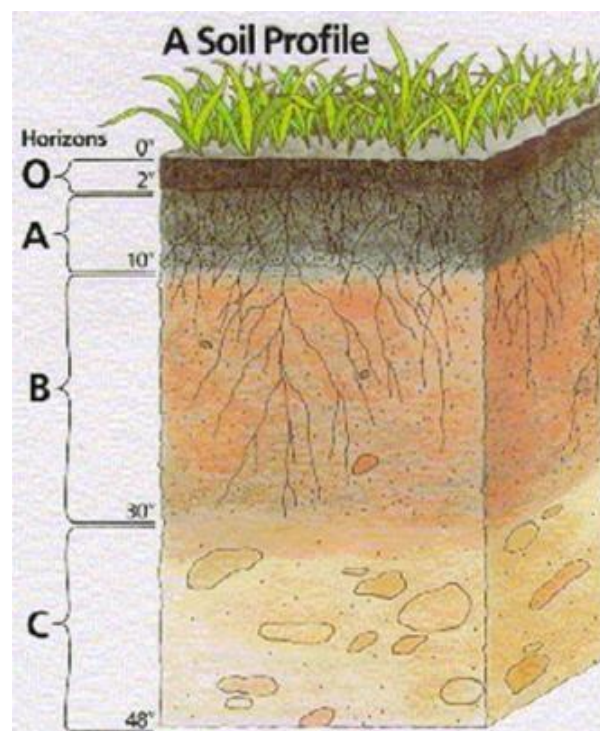


Figure 2: Soil Profile example

4.3 Soil Placement and Surface Preparation

1. Subsoil placement, backfilled areas should be allowed to settle before topsoil replacement to prevent undesired depressions and undermining of planted materials
 - If final site contours are level prepare subsoils accordingly.
 - If final site contours are to be “rough and loose” adhere to the project plan for determining surface undulation requirements.
 - In general, undulations are desired to be +/- .5m from midline (1m total vertical variation) and spaced out by 1-2m (1-2m horizontal distance between low points)
2. Any use of compost, fertilizers and soil amendments must be approved by the ESO in consultation with the vegetation specialist and in accordance with the [Section 6 and 7](#). Imported soils must adhere to the *Soil Movement and Sourcing Guidelines*.
3. Topsoil shall be reapplied at a depth of roughly 30-50 mm or at a depth of the original site conditions.
4. Topsoils should be distributed across planting area
 - For two lift procedures, the top layer is topsoil and organics.
 - For three lift procedures, the final layer of organics should be placed last.
 - Do not compact topsoil by driving repeatedly over site.
 - Keep topsoil unconsolidated in order to allow for seed infilling
5. Timing of placement and grading of topsoil should coincide with re-vegetation/seeding without winter intervening.
6. Grading or topsoil placement shall be completed to the satisfaction of the ESO prior to any surface preparation.
7. All eroded areas shall be corrected prior to surface preparation, as determined by the ESO, using local material where possible.
8. Areas to be seeded shall be loosened to a depth no less than 20 mm (greater where site conditions warrant) at the time of seeding to allow seed to be planted at a depth of 10mm-30mm.
9. If coarse woody debris is specified each piece must
 - Lie flat on the ground (branches should not be holding the stem off the ground)
 - Incorporated into the topsoils at one end prevent movement (see figure 3)
 - At a distribution that adheres to the *BFU LLYK Woody and Vegetative Debris Management Guidelines 2019* (Table 1)



Figure 3 Properly incorporated coarse woody debris (1 growing season)

4.4 Decompaction

1. Ensure that no further compaction will be occurring on site – this should be the last activity to occur as re-compacted soil is more damaging and compacted soils.
2. Use hand tools (shovels, row rakes) to decompact soil surface. Heavily compacted soils may require pick -axes or equivalent.
 - All soil “blocks” are broken up, soil should be loose and granular.
 - Depth will vary based on severity of compactions; compacted versus decompact soil should be an obvious change.
3. Site should be left rough, with seed being lightly fan-raked into soil.

Section 5: Revegetation - species selection, seeding, planting

Principles

1. Native species will be used in all cases to ensure representative and resilient communities.
2. Where infrastructure exists, Fire Smart principles must be considered in planting plan. This will limit the number of species that are available to be planted. No exceptions will be made.
3. Species with no or low palatability to wildlife must be used in projects near areas of high human use.
4. Timing is essential to success of reclamation.
5. All planting plans will be reviewed by the Vegetation Specialist.

Considerations

Species Selection – BFU Field Unit: Species must be suitable for the project site from a variety of perspectives including human-use, flammability (fire hazard) and human-wildlife coexistence. Materials should be sourced from nurseries and growers in Alberta Plant Hardiness Zone 3b (or as close as possible) to ensure successful establishment and suitable phenotype. In all cases native-collected material are preferred to cultivars. Proponents must provide their planned species for review as they are more familiar with exact site conditions. All seed mixes should include grass and forb (herbaceous) species when possible. Consider assessing the surrounding area to understand which species are most suitable (not applicable to developed areas). There are a variety of resources to help in suitable species selection; as well as the review process.

- *Recommended Plant Species for Landscaping in Banff National Park (2018)*
 - Note that this is not the same as the Town of Banff recommended plant list; which is not to be used on projects outside of the towns boundary.
- <https://www.biosphereinstitute.org/attractant-management-resources>
- Local landscaping and environmental professionals
- The Banff Field Unit Vegetation Specialist
- Appendix B: Standard Vegetation Prescription.

Species Selection- LLYK Field Unit

Species must be suitable for the project site from a variety of perspectives including human-use, flammability (fire hazard) and human-wildlife coexistence. Materials should be sourced from nurseries and growers from the same Plant Hardiness Zone (Kootenay NP 3A to 4B, Yoho NP 4A-4B and Lake Louise 3A-4B) (or as close too as possible) to ensure successful establishment and suitable phenotype. In all cases native-collected material are preferred to cultivars. Proponents must provide their planned species for review as they are more familiar with exact site conditions. For roadside application, LLYK field unit approve the use of the seed mixes referred in *Seed Mixes and Reclamation Strategies for Projects in the LLYK Field Unit of Banff, Kootenay and Yoho National Parks, 2016*. For any other application, seed mixes should be reviewed and approved by the field unit vegetation specialist. There are a variety of resources to help in suitable species selection; as well as the review process.

- *Seed Mixes and Reclamation Strategies for Projects in the LLYK Field Unit of Banff, Kootenay and Yoho National Parks, 2016*
- <https://www.biosphereinstitute.org/attractant-management-resources>
- Local landscaping and environmental professionals
- LLYK Field Unit Vegetation program

Material Type Selection: Projects should assess whether seeds, plugs, potted plants or turf is the most appropriate for their sites. High use sites should favor established vegetation as well as fencing to ensure revegetation is successful. Seeding without barriers (fences, closures) is not suitable for areas of high human-use.

Timing: Topsoil placement, surface preparation and planting/seeding should occur immediately after each other to ensure success. Consider keeping topsoil stockpiled until a time that all activities can be completed. Consider incremental seeding (phased-approach) to complete sections of project when appropriate. Consider forecast when seeding/planting; ideally planting with rain expected.

Planting Windows: Generally, there are two planting windows were vegetation establishment will be most successful. Planting/seeding outside these windows is not advised and generally results are poor, requiring a second seeding event. If planting outside of these windows irrigation must be completed at a suitable interval throughout the summer. For difficult -

to-establish sites, seeding outside of these windows is prohibited to ensure the responsible use of native seed (limited resource).

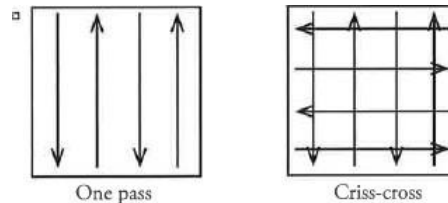
- Spring Window: April (soil must be thawed) to mid-June
- Fall Window: Late September to early November (soil must not be frozen)

Seed Certificates: Prior to purchasing, seed certificates for grass and for seed must be approved in writing by the vegetation specialist. Seed certificates must have the botanical name, seed analysis, lot analysis, seed origin and stamped by the certifying body. Seed analysis (germination tests) are not suitable replacements for seed certificates.

Activity Standards

5.1 Broadcast Seeding (hand, machine)

1. Ensure soils are prepped to receive seed (see [Section 4](#)). If hard-pan has developed, light raking will ensure surface is suitable.
2. Do not seed in high winds
3. Standard seeding rate is 25kg/ha and may be adjusted as dictated by site conditions (NNV, erosion, season and seeding methods).
4. Broadcast seeding should be completed in two passes. The second pass should be 90degrees to the first pass to ensure seed is applied to all soil surfaces. Objects on the soil can create “shadows” preventing seed placement in these areas, the second pass fills in the “shadows”. Application rate per pass should be ½ of the total application rate.



5. Seed should be planted 10mm-30mm below surface by completing seed-setting.
6. Seed set must occur - soil should be raked or rolled after seeding to set seed in place (and reduce foraging of seed). This generally is completed by hand but a light harrow may be acceptable for larger sites.
7. If wood-fiber mulch is being applied; follow the product instructions and make sure to account for any slope changes. See [Section 7](#).

5.2 Hydro seeding

1. Hydro seeding will only be approved on large sites located adjacent to infrastructure.
 - Generally, it is less effective at native vegetation establishment; should be expected to complete a second application on bare spots 1-year post-seeding.
2. Hydro mulch product and additives must be approved in writing.
 - See [Section 6](#)
3. Standard hydro seeding rate is 50kg/ha
4. Activity must be conducted by a trained professional and ensure all fiber-mulch product application instructions followed.
5. Water used in hydro-seeding must be obtained from a municipal source as past projects attempting to pump water from nearby freshwater streams have inadvertently (and unlawfully) introduced fertilizer and nutrients into freshwater streams; resulting in massive algal blooms. Withdrawing water from a waterbody in a NP without a RAP is unlawful.

5.3 Other seeding methods

1. Drill seeding, cyclone seeders and other methods can be used with approval.

Section 6: Soil Amendments

Principles

1. It is understood that soil amendments are required to establish vegetation on sites with poor soil quality
2. Soil amendments and additions are not to replace proper soil management practices.
3. Soil amendments require written approval.
 - Broadcast granular fertilizer application will not be approved in BNP
 - Targeted fertilization using slow-release products will be considered for planted materials.

Considerations

Approvals: There are hundreds of soil amendment and engineered soil medium products on the market; each requiring review and approval. As not all amendments will be approved it is important to submit for approval as soon as possible. Generally, products that are approved do not contain non-biological based macro and micro nutrients, do not leach and support our native species establishment (slow release). A product specification sheet or laboratory analysis must be submitted for review.

Concentration: Native vegetation has evolved with relatively poor macro nutrient requirement (as compared to landscaping ornamentals and non-native vegetation) and having too high of concentration of macro nutrients decreases establishment of native species and increases non-native grasses and forbs. As a result, amendment volumes (and topsoil lifts) may appear to be too low to support vegetation growth; however, this relatively low nutrient soil supports native establishment over non-native.

Activity Standards

6.1 Amending topsoil

1. Subsoil contours should be established (see [Section 4](#))
2. If topsoil is available; ensure it is evenly distributed across the site.
 - Best practice (if possible) is to complete mixing of topsoil and amendment at an approved staging area prior to distributing across the site.
3. Amendment evenly across site if possible, or in a consistent manner
 - Ensure approved ratio of amendment: topsoil is achieved
4. Use equipment to effectively mix only the topsoil lift (do not mix subsoils). This can be accomplished using row rakes, harrow or machinery.
5. Grade and prepare surface as per [Section 4](#).

Section 7: Hydraulically applied mulch and tank mix additions

Principles

1. Hydraulically applied wood-fiber mulch (hydro-mulch) has been shown to improve native seed establishment and germination.
2. Hydro-mulch and hydro seeding (hydro-mulch + seed) are different. Hydro seeding is less effective at establishing native species due to seed being stuck in the mulch matrix (rather than the soil)
3. It is understood that tank-mix additions can be added to hydro-mulch to improve vegetation establishment.
 - Biotic addition and amendments (including fertilizers) must be approved in writing.

Considerations

Approvals: There are many possible tank-mix additions, each requiring review and approval. As not all amendments will be approved it is important to submit for approval as soon as possible. Generally, products that are approved do not contain non-biological based macro and micro nutrients, do not leach and support our native species establishment (slow release). A product specification sheet or laboratory analysis must be submitted for review.

Wood-fiber mulch: Wood-fiber mulch shall be clean and free of weeds and other foreign matter, be 100% biodegradable, compatible with the environment, and shall contain no germination inhibiting components.

Bark-mulch: Bark-mulch is not generally recommended in reclamation/restoration and is considered a fire hazard; it is often confused with wood-fiber mulch, which is typically the main constituent of hydraulically applied mulch. Upon approval, under the purview of the *BFU/LLYK Vegetation and Woody Debris Management Guidelines 2019*, wood that is mulched on site can be used.

Tackifier: Proponents should carefully consider the amount of tackifier to be used on windy and exposed sites (consult experts). Tackifier must be capable of joining together the mulch particles to secure the mulch to the ground. The binder shall not form an impervious seal that will prevent the penetration of moisture to underlying soil.

Activity Standards

7.1 Hydro-mulch application

1. Hydro-mulch must always be applied as per specific product instructions
 - Typically to be applied during calm conditions and dry forecast for > 24 hours.
 - Typically, at a min of 4mm
2. Tank additions (biotics) must always be applied as per specific product instructions.
3. Ensure that full coverage is attained (ground should be entirely covered to ensure erosion protection) and depth is consistent across site.
4. Do not cover trees, stumps, shrubs or established vegetation with mulch. If this occurs, it must be removed by hand.
5. Dispose of any leftover tank mix at an appropriate landfill; do not spread additional layers or dump onsite.
6. Water used in hydro-mulching must be obtained from a source as past projects attempting to pump water from nearby freshwater streams have inadvertently (and unlawfully) introduced fertilizer and nutrients into freshwater streams; resulting in massive algal blooms. Withdrawing water from a waterbody in a NP without a RAP is unlawful.

Section 8: Monitoring, Maintenance and Site Closure

Principles

1. Monitoring and maintenance is an essential part of reclamation and has financial implications to proponents.
 - While PCA monitors sites periodically, it is the proponent's responsibility to monitor and address deficiencies for items identify under warranty.
2. It is understood that reclamation takes many years to meet site conditions below – generally monitoring and site visits will determine if a suitable reclamation trajectory has been achieved.

Considerations

Responsibility: Project proponents are responsible for establishment of native vegetation growth and control of non-native vegetation until site (and project) has satisfied the ESO (in consultation with vegetation specialist). Warranty, contract hold-backs and additional measure will be taken to ensure site reclamation is achieved.

Reclamation Acceptance Conditions: Unless otherwise stated; the following general site conditions must be met

- <20% Bare soil (>80% desired native vegetative cover)
- No new NNV species present (does not include species that were present pre-disturbance)
- No increase in extend/density of NNV present prior to disturbance; it is the projects responsibility to document original site conditions.
- No erosion issues
- >80% planting survival

Maintenance: Best practice is for projects to plan NNV management for 2-5 years post construction. Plantings and vegetation establishment are generally covered under warranty and ongoing maintenance (replacement, re-seeding) should occur until achieved.

Activity Standard

8.1 Monitoring Report

1. Following are examples of what needs to be monitoring and reported on
 - NNV Survey and documentation
 - Seed establishment assessment
 - Planted materials assessment
 - Erosion assessment
 - Bare area assessment
2. Any deficiencies should be rectified with addition activity (maintenance) until decided condition is achieved.

Document Control Tracking

Date of Issue	Author(s)	Brief Description of Change
March 16 th , 2021	Brian Yakiwchuk, Fire/Veg, BFU	Document submitted for approval after incorporating comments from review process.

Appendix A: Qualified Environmental Professional (QEP) – External

The following are desired qualifications for a variety of activities relating to reclamation planning and implementation.

Reclamation Plan Development (Design)

- 10 + years' experience developing and implementing reclamation/restoration projects that involve;
 - Earthworks and Erosion and Sediment Control plans
 - Sourcing and assessing suitable, weed-free, topsoil
 - Collection and propagation (on site or through nurseries/growers) of native species (grass, forbs, shrubs, trees) and development of planting plans.
 - Invasive vegetation management integration into project delivery
 - Ecological function based end-point goals, objectives and monitoring criteria
 - Phased project delivery
- Experience must include projects planned/delivered in the Montane and/or Subalpine natural subregions.
- Professional agrologist (P.Ag) or biologist (P.Biol) in good standing with applicable provincial agencies.

Reclamation Plan Implementation (Supervision)

- 5+ years' experience leading project activities such as
 - Fill, sub soils and topsoil placement
 - Installation and maintenance of native plant materials
 - Erosion and sediment control plan implementation
 - Implementing mitigations of Environmental Assessments and/or Environmental Protection Plans
 - Invasive vegetation identification and management
- Professional agrologist (P.Ag) or biologist (P.Biol) in good standing with applicable provincial agencies.

NNV Survey

- Must be able to identify all early detection rapid response (EDRR), rank 1, rank 2 and rank 3 species at all phenological stages (including non-native grasses) to the satisfaction of the Vegetation Specialist.
- Must have the ability to properly document occurrences as per Appendix C.

Rare Plant Survey

- 5+ Years' experience completing Rare Vegetation Surveys within the applicable sub region of Alberta (Montane, Subalpine or Alpine) and;
- Must adhere to the Alberta Native Plant Council Guidelines for Rare Plant Surveys in Alberta, including its "Qualifications of Surveyors" section.

Appendix B: Reclamation Template for Developed Areas (BFU ONLY)

This template is intended for small, simple projects where minimal disturbance is occurring (~10m²) within front country locations associated to largely non-native vegetation type (turf-grass dominated).

Project/Location: _____

Responsible Person (proponent) _____ Phone Number _____

1. NNV Management

Prevention: Cleaning all equipment (boots, tools, machinery) (mandatory)

EDRR or rank 1 species present? No Yes, complete Appendix C

Rank 2 and 3 species present? No Yes, complete mechanical control of plants/removal of flower/seed heads within 10m at all times during project delivery.

Comments:

2. Topsoil Management

Topsoil will be removed and stored separately from subsoils, ensuring no mixing (mandatory)

Using Hand tools small machinery

- No topsoil will be imported (mandatory)
- Topsoil will be stored for less than 5 days (mandatory)

Comments:

3. Revegetation

Turf present on site? No Yes, complete sod salvage (See Section 3)

Site has no NNV nearby, no turf grass and >70% native vegetation cover?

No Yes, use topsoil as seed source, do not seed.

Site has minimal vegetation (pre-disturbed)? No Yes, hand-seed after disturbance with BNP Developed Area Mix or use purchased turf in high-use areas.

If present, rake leaf and needle litter onto disturbance post-project (helps prevent wind erosion)

Comments:

4. Monitoring and Maintenance

Vegetation survival will be monitored on _____ (date) (mandatory) and;

Any bare areas, or new NNV species will be remedied (mandatory)

Comments:

Review

Reviewed (including suitability of template use) by _____ Date _____

Comments

Developed Area Seed Mix and Common Plantings (BFU2020)			
Species	Species (Latin)	% Weight	Comments
Smooth Wild Rye	<i>Elymus glaucus</i>	35	quick germ, drought tolerant
Rocky Mountain Fescue	<i>Festuca saximontana</i>	20	Deer resistant/unpalatable
June Grass	<i>Koeleria macrantha</i>	15	Good competitor for Kentucky Bluegrass - early spring growth
Alpine Blue Grass	<i>Poa alpina</i>	5	tolerates heavy traffic, pioneer
Awne wheat grass	<i>Agropyron trachycaulus var. subsecundus</i>	10	Saline; short plant, quick establishment
Fringed brome	<i>Bromus ciliatus</i>	10	cold tolerant, excellent for roadside
Yarrow (white)	<i>Achillea millefolium</i>	5	Must be white variety.
Ideal substitutes or additions			
Spike Trisetum	<i>Trisetum spicatum</i>		For lowline/hydric areas areas
Tickle grass	<i>Agrostis scabra</i>		For lowline/hydric areas areas
Shrubs			
Shrubby cinquefoil		<i>Potentilla fruticosa</i>	
Common wild rose		<i>Rosa woodsii</i>	
Meadowsweet		<i>Spiraea betulifolia</i>	
Wolf willow		<i>Elaeagnus commutata</i>	
Trees			
Trembling aspen		<i>Populus tremuloides</i>	
Balsam poplar		<i>Populus balsamifera</i>	
Considerations			
<p>Mesic/xeric sites (roadside, pits, ditches, campground area (with this moisture regime)) low palatability. Not all species will be suitable for all sites – use nearby vegetation as a guide. Not an exhaustive list of approved species.</p>			

Appendix C: Non Native Vegetation Management Plan Template (BFU ONLY)

Proponent/Project: _____

Responsible Person: _____ Phone #: _____

1. Overview

Purpose of NNVMP <input type="checkbox"/> PCA Operator (OCAs, camp, utilities etc.) – annual submittal of section 1 and 2 <input type="checkbox"/> Project (all sections to be completed)	Monitoring Frequency: <u>PCA operators:</u> Form (section 1 and 2) must be completed annually for PCA operators and submitted by October 31 st <u>Projects:</u> Inspections for duration of project and annually until warranty expiry
Expert Consultation: Yes <input type="checkbox"/> No <input type="checkbox"/>	if YES, name and contact information of Expert: Veg Specialist/ESO _____ Consultant _____
NNV Survey: <input type="checkbox"/> Completed/Known Occurrences <input type="checkbox"/> Required; planned _____	
Prevention: <input checked="" type="checkbox"/> Cleaning all equipment (boots, tools, machinery mandatory) <input type="checkbox"/> Weed seed analysis (soil) <input type="checkbox"/> Seed certificate review	
Control: <input type="checkbox"/> Mechanical <input type="checkbox"/> Chemical (RAP required, Certified Applicator Required, Code of Practice / Product Label to be followed)	
Disposal:	
Submittal Date:	
Comments:	

2. Identification, Control and Monitoring of NNV

Characterise NNV noted in survey and planned control methods. This table is to be updated at each submission in order to monitor infestation size. Add lines as required or track in excel format.

Common Name	Rank	Extent (est)	Mechanical (timing)	Chemical (timing)	Location Comments
<i>Ex: Canada thistle</i>	2	30m ²	<input checked="" type="checkbox"/> July-Aug	<input checked="" type="checkbox"/> Sep	<i>Located along the north end of the septic field, near the garage door.</i>
			<input type="checkbox"/>	<input type="checkbox"/>	
			<input type="checkbox"/>	<input type="checkbox"/>	
			<input type="checkbox"/>	<input type="checkbox"/>	
			<input type="checkbox"/>	<input type="checkbox"/>	
Monitoring Date					

Map provided (required for operators) Alternative approved monitoring method _____

Photos provided (required for operators)

Methods (provide details on mechanical/chemical control planned as per resources)

3. Chemical Control (requires Restricted Activity Permit - do not complete without written approval)
 If chemical methods are being used or planned, please complete the following (table can be copied and completed for each pesticide to be used). If completing for a PCA operator with an approved Integrated Pest Management Plan (IPMP); do NOT complete section 3 or 4, refer to your IPMP and check this box

Product Trade Name:		PCP #:
Active Ingredient(s) / guarantee:		
Estimated size of area to be treated:		
Method of Application:	Liquid spray (spot treatment)	
	Spot spraying is the ONLY allowed application method in BNP	
Are any of the following areas within 30 m of the site of proposed pesticide application? If so please also complete section 4 below.		
Potable water supplies <input type="checkbox"/>	Species at Risk: individuals, residences, and/or identified critical habitat* <input type="checkbox"/>	
Drainage ditch (wet or dry) <input type="checkbox"/>	Standing surface water (ex. lakes, ponds, etc.)* <input type="checkbox"/>	
Children's play areas <input type="checkbox"/>	Flowing surface water (ex. river, streams, canals, etc.)* <input type="checkbox"/>	
Public use areas <input type="checkbox"/>	Other wetlands (ephemeral channels)* <input type="checkbox"/>	
Sensitive wildlife (ex. species-at-risk, migratory birds) observed or known to be present during proposed pesticide management and complete avoidance is not feasible* <input type="checkbox"/>		
Sensitive natural areas or features (ex. riparian areas, other sensitive vegetation communities, rare plants, nests, etc.) within recommended buffers on product label* <input type="checkbox"/>		
Non- target species identified as culturally or spiritually significant by Indigenous Nation(s). <input type="checkbox"/>		
If any of the above areas were selected please describe the area, including the distance to the proposed treatment area. Identify potential environmental impacts on valued components and any site-specific mitigation measures to minimize impacts.		
Contractor Name: _____		
<input type="checkbox"/> Control records provided to ESO/Vegetation Specialist (max 2 weeks post application)		

4. Impact Assessment Determination (to be completed when pesticide application is near sensitive areas/ features listed in section 3).

Summary of Potential Residual Effects and mitigations:

SARA Requirements

- There are no residual adverse effects to species at risk and therefore the SARA prohibitions

The [SARA Permit Decision Tool](#) used and determined:

- There is no contravention of SARA prohibitions
- Project activities contravene a SARA prohibition and CAN be authorized under SARA
- Project activities contravene a SARA prohibition and CANNOT be authorized

Determination of Significance:

Taking into account implementation of mitigation measures outlined in this document, the IPM Plan and the activities contained herein, are:

- Not likely to cause significant adverse environmental effects.
- Likely to cause significant adverse environmental effects.