BCTS Chinook Business Area

Forest Stewardship Plan

Sea to Sky Natural Resource District

Supporting Information

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1. Introduction

This document provides the statutory decision maker with the supporting information and documentation that BC Timber Sales (BCTS) used when developing the Results, Strategies, and Measures for the BCTS Sea to Sky Natural Resource District Forest Stewardship Plan (FSP).

In response to the Forest Practices Board (FPB) audit, BCTS has prepared this FSP to meet the legal requirements as outlined in the FPB report. BCTS has reviewed the District Manager's Letter of Expectation (LOE) (June 30, 2016), and the Chief Forester's Guidance on the Replacement of FSPs (March 2016). All the topics have been reviewed and considered for inclusion in the FSP.

It is important to recognise that many of the recommendations and issues addressed in this document are not legally binding. This supporting document will address many of those topics and indicate how it was considered during the development of the FSP, but that does not mean that all of the considered information is referenced in FSP.

1.1 Definitions:

"FPPR" means *Forest Planning and Practices Regulation*

"WLPPR" means Woodlot Licence Planning and Practices Regulation

"SMRZ" means Special Resource Management Zones

"MAC" means matrix activity center

2. Summary of Changes to the FSP

- Review of all results, strategies, and/or measures to ensure they are measurable and verifiable.
- Consideration and incorporation of issues noted in FPB audit, Chief Forester's Guidance and District Manager's Letter of Expectation.
- Incorporation of new legislation into results, strategies, and measures.
- Consideration of draft legislation.
- Increased detail in the First Nations information sharing process within the Cultural Heritage Resources Results and Strategy.
- Increased detail in the stakeholder information sharing process.

2.1 Response to District Manger's Letter of Expectation

The LOE notes that over the past decade there have been substantive changes with regard to the bio-physical landscape.

Over this time, BCTS has worked to stay abreast of these changes and to continuously improve business processes. This is evidenced by a more robust information sharing process with First Nations and stakeholders, incorporation of new legislation, consideration of draft guidance into forest development planning, and BCTS' ongoing commitment to safety.

Specifically, this is demonstrated by the following:

1. Safety Accord Forestry Enterprises (SAFE) Companies certification;
2. ISO 14001 certification;
3. Sustainable Forestry Initiative (SFI) certification;
4. regular internal and external audits;

5. development of BCTS Chinook Business Area Best Management Practices (BMPs)
    a. e.g. Wet Weather Shutdown Guidelines
    b. e.g. invasive plants measures;
6. robust information sharing process with First Nations and stakeholders;
7. new legislation is incorporated in the FSP;
8. draft legislation is considered as part of forest development planning;
9. timber sale licence documents include more specifications (e.g. Detailed road construction, steep slope information, etc.);
10. continuous improvement processes for operations; and
11. review of Forest Resource Evaluation Program (FREP) data

Legislation is constantly changing and BCTS reviews, considers, incorporates, and complies with legal directions.

2.2 Public Information Sharing

The FPB audit and the LOE indicate concern with the lack of public review afforded by the current system of FSPs and a need to ensure that the public is more engaged and able to review plans on a regular basis.

BCTS has a robust information sharing process with stakeholders. In our planning stages, BCTS prepares and sends out an operating plan (OP). This OP includes: block name, location, age, site description, constraints, area (ha), estimated volume, species composition, planned assessments, harvest method and any other relative comments. The intent is to provide as much information as possible.

BCTS considers the information brought forward during the OP referral stage and develops mitigation strategies, if required, prior to layout beginning. The engineered shapes are then re-shared with First Nations and stakeholders providing more detail, and another opportunity for feedback.

Examples of how BCTS has addressed concerns raised by stakeholders include:

1. required timing restrictions regarding harvest operations and hauling;
2. cut block boundary changes;
3. additional clauses within the timber sale licence to require
    a. Signage, trail closures, trail rehab, notification of stakeholders;
4. additional clauses within the road permit;
5. recommendations for additional clauses for the road use permit issued by district;
6. notification of stakeholders prior to harvest commencement;
7. invitation to attend pre-work with the licensee prior to harvest commencement; and
8. trails and features are often considered despite the fact that they are not legally established.

Throughout the information sharing process, BCTS focuses on relationship building. BCTS understands the importance of building and maintaining social licence with the public. BCTS has increased the frequency of information sharing, and protocols are in place to guide that process. We have also tried to educate stakeholders about our mandate and our process.

The range of stakeholders includes:

1. recreation groups;
2. regional district government;

3. municipal governments;
4. water licence holders;
5. tenure holders; and
6. private landowners other forest licensees.

2.3 Public Safety

BCTS works hard to maintain safety at all times in all our practices, our safety page can be located at: https://gww.for.gov.bc.ca/bcts/ba/safety/tch/.

As recreational use increases within the working forest, the public will find themselves in closer proximity to BCTS operations. The following list is a variety of methods BCTS routinely employs to improve safety for all parties:

1. Environmental field procedures:
   a. EMS program provides guidance on how to behave in operational conditions (e.g. Hazard assessment, reporting, etc.);
2. Checklist reports and guidance:
   a. helps to ensure that all hazards and risks are identified and addressed, and
   b. formalizes documentation;
3. Timber sale licenses now include a highlights sheet:
   a. increases awareness of licensee responsibilities (e.g. signage, timing, etc.),
   b. highlights special circumstances (e.g. Trail closures, steep slopes, etc.), and
   c. reinforces requirements (e.g. Communication plan with stakeholders);
4. Licensee pre-works:
   a. These pre-works help highlight any safety concerns with regard to the activity and includes risk rating matrices and other measures to ensure that all parties are aware of the hazards that may be present,
   b. For licenses where conditions exist to protect/preserve site features, the affected stakeholder is invited to be in attendance at the pre-work to facilitate communication, and
   c. BCTS uses tools like timing restrictions, trail closures and signage to ensure that any public users are well informed of safety information.

3. Response to Chief Forester's Guidance Letter, March 2016

3.1 Fire Management Stocking Standards

BCTS has not included specific stocking standards for fire management because it is not something we actively manage for. Cutblocks and permits are designed with the goal of supplying fibre to the market so that the timber pricing mandate can be achieved. Designing cutblocks with fire/fuel management as the main objective is currently out of scope for BCTS in the Sea to Sky Natural Resource District. Any standards developed would be done in response to a legacy or unique situation and BCTS feels the best approach is to prescribe those on a case by case basis to ensure that the prescription takes into account all of the site specific factors.

3.2 Non-Legal Guidance

BCTS considers draft guidance when planning operations and incorporates the recommendations where it is operationally practicable. Recommendations are viewed in the context of fibre supply, operational issues and environmental management.

3.3 Monitoring Trends – Forest Resource Evaluation Program (FREP)

The results and recommendations of the FREP reports are considered and incorporated when operationally practicable. In addition, BCTS staff attends various training opportunities, and continuous improvement principles are applied to forest operations.

3.4 Draft Orders for Species at Risk

Any draft orders that are in place are considered in the context of fibre supply, operational issues and environmental management. BCTS has developed BMPs that include practices to manage for SAR, including seeking advice from a qualified professional when encountered. The presence of SAR is evaluated at all five phases of block development, to ensure all known species are addressed in plans.

4. BCTS Information Sharing Process

4.1 Who BCTS Engages

The primary criterion for engaging First Nations and public stakeholders is the geographic location of the planned activity. Using iMapBC as the primary mechanism to identify First Nation and stakeholders, BCTS shares information regarding the proposed forest development (e.g. timber harvest and road construction) with parties who have a vested interest in the land.

BCTS identifies First Nations and stakeholders, from the range listed below:

1. first nations;
2. BC government agencies;
3. municipalities and regional districts;
4. land and water tenure holders;
5. private land owners;
6. stakeholders and interest groups (e.g. recreation groups);
7. trap line holders; and
8. additional groups that self-identify

Given the number of years BCTS has been operating in the Sea to Sky Natural Resource District, there is a solid understanding of who the stakeholders are. That said BCTS continually scans the land base for new stakeholders to add to the referral list.

In addition to information sharing package mail-outs, BCTS makes all information sharing information available on the web. This provides the opportunity for stakeholders to self-identify and become involved in the process.

4.2 How BCTS Engages: Information Sharing Process

The process outlined in the next section of this document details BCTS' information sharing process for planning and operational activities.

The process is divided into two categories. The first is specific to First Nations information sharing, while the second is the protocol for stakeholders. While the processes vary slightly, the intention is the same – share information and seek feedback through a meaningful engagement process.

4.2.1 First Nations Information Sharing Process

The First Nations information sharing processes are outlined below:

1. OP:
    1. OPs are sent, at least once per year (or more often as new projects progress). These OPs contain proposed cut blocks and roads that have not yet been engineered in the field.
    2. Details such as, block name, location, landscape unit, stand age, estimated area, volume, planned assessments, species composition, harvest method, comments, maps, shape files, and road information are included when possible.
    3. BCTS follows the timeframes and consultation levels defined in First Nation Forestry Consultation and Revenue Sharing Agreements (FCRSAs). When requested BCTS tries to accommodate requests for timelines extensions.
    4. If more than three years has passed, a previously referred cutblock will be shared again with First Nations to ensure they have no new concerns.
2. Changes to the Proposed Development:
    1. When a cutblock undergoes significant changes such as the size (i.e. >25%), shape or location, BCTS will re-share with First Nations to ensure they have no new concerns.
3. No Reponses Received:
    1. If no responses are received, BCTS will send a follow up letter requesting input.
4. Responses Received:
    1. All comments and concerns are considered by BCTS. A meeting with a First Nation may be required to better understand concerns and how to effectively address them. First Nations' concerns may be incorporated into forest development planning in order to minimize or mitigate the impact of timber harvest activities on a First Nation's Aboriginal interest(s).
    2. If BCTS cannot address a First Nation's concern then a written response will be provided with a rationale.
5. Assessments:
    1. If the cutblock(s) require a visual impact assessment, a terrain stability assessment and/or a hydrological assessment, BCTS will ensure they are completed and provided to First Nations, if requested. A qualified professional will review the assessments and make recommendations that will be specified in a plan.
    2. Additional assessments may also be requested by a First Nation such as:
        i. Preliminary Field Reconnaissance
        ii. Archeological Impact Assessment
        iii. Traditional Use Study
        iv. Heritage Field Reconnaissance
        v. Botanical Resource Surveys
    3. Recommendations from these assessments are considered by BCTS, additional meetings with a First Nation may be required develop mitigation strategies, if required. BCTS will provide a written response indicating which recommendations can be implemented and a rationale if recommendations cannot be implemented.
6. Further Information Sharing at the Timber Sale Licence (TSL) stage.
    1. For First Nations that responded to the OP, BCTS will notify them of the TSL number, the associated cutblocks, and roads and the planned TSL advertisement date.

7. Notification
    1. The timber sale licence document lists the First Nations that must be notified. Licensees are required to provide a minimum of 2 weeks' notice, prior to harvest commencement.
8. Due Diligence Report (DDR)
    1. A DDR summarizing the information sharing process and any accommodations that were made is prepared and approved by the timber sales manager.

4.2.2 Stakeholders Information Sharing Process

This process is similar to the information sharing process used for First Nations with minor exceptions including consultation time frames and that BCTS does not complete assessments related to Aboriginal interests.

1. OP:
    a. OPs are sent, at least once per year (or more often as new projects progress). These OPs contain proposed cut blocks and roads that have not yet been engineered in the field. BCTS attempts to provide a package which accurately represents the planned activities.
    b. Details such as, block name, location, landscape unit, stand age, estimated area, volume, planned assessments, species composition, harvest method, comments, maps, shape files, and road information are included when possible.
    c. These plans are sent with a request for a response within a specified time frame. This varies with stakeholders, but it is never less than 30 days.
    d. If more than three years have passed, a previously referred cutblock will be shared again with stakeholders to ensure they have no new concerns.
2. Changes to the Proposed Development
    a. When a cutblock undergoes significant changes such as the size (i.e. >25%), shape or location, BCTS will re-share with stakeholders to ensure they have no new concerns.
3. No Reponses Received
    a. If no responses are received, BCTS will send a follow up letter requesting input.
4. Responses Received
    a. Comments and concerns are considered by BCTS. A meeting with the stakeholder may be required to better understand their concerns, and plans may change in order to minimize or mitigate the impact of timber harvest activities on the stakeholder value.
5. Assessments
    a. If the cutblock(s) require visual impact assessment, terrain stability assessment and or a hydrological assessment, BCTS will ensure they are completed. A qualified professional will review the assessments and make recommendations that will be specified in a plan.
6. Further Information Sharing at the TSL stage.
    a. For stakeholders that responded to the OP, BCTS will notify them of the TSL number, the associated cutblocks, and roads and the planned TSL advertisement date.
7. Notification
    a. The timber sale licence document lists the stakeholders that must be notified. Licensees are required to provide a minimum of 2 weeks' notice, prior to harvest commencement.
8. Due Diligence Report (DDR)
    a. A DDR summarizing the information sharing process and any accommodations that were made is prepared and approved by the timber sales manager.

5. Protection of Cutblocks and Roads

BCTS has declared blocks in Amendment #12 to FSP #179. There are no additional cutblocks to be declared at this time.

Road Permits in effect have been listed in appendix Table A3 of the FSP.

6. Results or Strategies

6.1 Soils

The objective set by government for soils in the FPPR is “without unduly reducing the supply of timber from British Columbia's forests, to conserve the productivity and the hydrologic function of soils”. BCTS will default to the Soils Practice Requirements detailed in sections 35 and 36 of the FPPR.

Performance measures are in place on a block specific basis to help ensure that soils are protected. For example:

1. Site Plan and Harvest Plan documents align with sections 35 and 36 of the FPPR and are signed by a qualified professional.
2. Soil disturbance limits and permanent access structures (PAS) limits are calculated and specified in a plan.
3. Harvest operations are inspected to ensure the plan is followed and the soil resources are protected. Compliance and Enforcement Branch staff will be notified if limits are exceeded.
4. Detailed road construction and deactivation/rehabilitation require a sign off by a qualified professional to ensure the activity meets design/plan specifications, and soils are protected.
5. Bridge installations require a sign off by a qualified professional, to ensure construction meets design specifications, and soils are protected.

Best Management Practices (BMPs)

BCTS implements the following BMPs for soil conservation:

1. Machine Free Zones
2. Wet Weather Shutdown guidelines
3. Soil disturbance limits and PAS limits

6.2 Wildlife

The presence of SAR is evaluated at five different stages in block development, to ensure the latest information is used.

- Stage 1: Block Planning and Development
- Stage 2: Block/Engineering layout Pre-Work
- Stage 3: Field Work Quality Assurance
- Stage 4: Site Plan/ Road Site Quality Assurance
- Stage 5: TSL/Contract Package Preparation

BCTS commits to seeking advice from qualified professionals, as required, and will also provide updates the BC Conservation Data Center (CDC) with any relevant field information that pertains to SAR.

6.2.1 Marbled Murrelet

The TSM will undertake to comply with the Order.

Order – Wildlife Habitat Areas 2-303 to 2-306, 2-308, 2-309 &2-316 (April 15, 2014)

6.2.2 Spotted Owl

Special Resource Management Zones (SRMZ) and Matrix Activity Centres (MAC) are applicable to the Sea to Sky Natural Resource District

The TSM will undertake to comply with the Order.

Order - Wildlife Habitat Areas (WHA) 2-517 to 2-525 (February 28, 2013)

6.2.3 Coastal Tailed Frog

The TSM will undertake to comply with the Order.

Order- Wildlife Habitat Areas 2-272 to 297, 2-381 to 2-386, 2-388, 2-390 to 2-406, 2-436 to 2-443 Grizzly Bear – Squamish Forest District (Aug 25, 2010)

(*Note: the Coastal Tailed Frog WHA is entirely overlapped by the Grizzly Bear WHA and is included in the same order)

6.2.4 Grizzly Bear

The TSM will undertake to comply with the Order and Notice

Order- Wildlife Habitat Areas 2-272 to 297, 2-381 to 2-386, 2-388, 2-390 to 2-406, 2-436 to 2-443 Grizzly Bear – Squamish Forest District, dated Aug 25, 2010

Notice – INDICATORS OF THE AMOUNT, DISTRIBUTION AND ATTRIBUTES OF WILDLIFE HABITAT REQUIRED FOR THE SURVIVAL OF GRIZZLY BEAR IN THE SQUAMISH NATURAL RESOURCE DISTRICT Amendment, dated Aug 17, 2011

6.2.5 Northern Goshawk

No order is currently in place, BCTS has committed to seeking advice from a professional when Northern Goshawk is encountered.

6.2.6 Pacific Water Shrew

No order is currently in place, BCTS has committed to seeking advice from a professional when Pacific Water Shrew is encountered.

6.2.7 Ungulate Species, SAR, WHA, Section 7

The TSM will undertake to comply with the objectives established under sections 9(2) and 12(1) of the following Government Action Regulations (GAR) Orders:

#U2-002, Order dated October 6, 2003; Order- Mountain goat (*Oreamnos americanus*) Soo TSA;

#U-2-005, Order dated October 31, 2014; Order – Amendment to Ungulate Winter Range U-2-005 Black tailed Deer and Moose- Sea to Sky Forest District, Soo TSA

#U-2-007, Order dated July 5, 2007; Order – Ungulate Winter Range (mountain goat) #U-2-007, TFL38

#U-2-008, Order dated July 5, 2007; Order- Ungulate Winter Range (black-tailed deer &mule deer) #U-2-008

#U2-010, Order dated March 17, 2005, Order- Ungulate Winter Range #U-2-010 (Moose (Alces alces), within TFL38)

6.2.8 Species at Risk: Non-Legal if outside of a Section 7 Notice

BCTS has addressed SAR within the FSP document. Species that are not currently subject to a section 7 notice (e.g. SAR Notices FPPR section 7 and WLPPR section 9) have been addressed in the following ways:

- BCTS Chinook's SFI certification requires that BCTS Chinook manage for red listed species as defined by the provincial and federal governments, and, must also manage for species that are classified as critically imperilled or imperilled by Nature Serve.
- BCTS ensures that any forest resource development activities protect and manage for both the species and its critical habitat.
- BCTS Chinook ensures that any plant, animal, or ecological community that meets the SFI criteria is managed for on a block by block basis, and, that all staff, contractors, and licensees are made aware of the presence of any of these species that may exist in the areas of operation.
- If previously unidentified species are located that have not been managed for, that under our Environmental Management System, operations must cease until such time as a qualified professional has been consulted and a decision on how to proceed is made.
- BCTS also has a comprehensive Invasive Plant management program that ensures that invasive plant species are not spread by operations. Special attention is paid when there are invasive plant species that could negatively impact habitat of an endangered species in areas of proposed operations.
- All strategies applied in these cases will be documented and included in a plan.

6.3 Water

BCTS is adopting the default riparian classifications for streams, wetlands, lake and the restrictions in riparian management areas as outlined in the FPPR sections 47-51, 52(2) and 53 (for temperature sensitive streams).

Hydrologic reviews will consider the potential impacts of timber harvest activities on water quality, water quantity, timing of water flows, and to assess the risk to public health.

Inside community watersheds, the TSM will ensure that any forest activities undertaken are consistent with the recommendations of the qualified professional who prepares the plan. The qualified professional will use the Coastal Watershed Assessment Procedure (CWAP) guidebook as reference as well as Integrated Watershed Management Plans (IWMP) for the Stawamus/ Mashiter and Pemberton watersheds (as they apply) and will ensure this information is considered in any hydrologic review.

A copy of the professional report (hydrologic assessment) will be held by BCTS and will be made available for review to stakeholders and First Nations.

Performance Measure

- Site plans (SP) identify watercourses to the default riparian classifications and indicate any offsets and management/reserve zones,
- Watershed documents are referenced in the SPs where they apply,
- Water assessments are performed, results are assessed and any required mitigation is specified in a plan (SP document).

6.3.1 Retention Levels in Riparian Management Zones (RMZ)

One of the recommendations from FREP reports and the Multiple Resource Value Assessment Sea to Sky District (December 2013), is increased retention in the first 10m for S5 and S6 streams.

BCTS has reviewed reports, attended the recent "FREP/Industry Small Streams Workshop" (FLNRO) and taken part in the associated webinar (ABCFP). This information coupled with the understanding that in the Sea to Sky Natural Resource District, streams are abundant and display a wide range of variability with respect to riparian features (e.g.the role of trees: conserving water quality, habitat, biodiversity and stream bank integrity), BCTS does not have a blanket policy, but instead will manage RMZ retention levels on a site specific basis. Retention levels will be prescribed by a qualified professional through a riparian assessment. The assessment will consider all factors listed in Schedule 1(2) of the FPPR. Road and cutblock design will be consistent with the RMZ retention levels as recommended in the riparian assessment and those retention levels will be specified in a plan.

BCTS will continue to review FREP reports, and will consider recommendations during planning processes. The "FLMT Riparian Management Emphasis Field Guide (North Island – Central Coast Forest Management Leadership Team)" is a document that provides local level guidance for qualified professionals.

6.3.2 Non Spatial Old Growth Objectives within the Elaho and Upper Squamish FDUs.

The TSM will work with the holders of the TFL 38 licence, North West Squamish Forestry Limited Partnership (NWSF), to ensure the Old Growth Retention Targets for Non-spatial Landscape Units are met.

Currently, all BCTS blocks located within the Elaho and Upper Squamish FDUs are developed by the licence holders of TFL38, NWSF. Through a Cooperative Management Agreement (CMA) NWSF develops blocks, BCTS purchases this development (all assessments, layout and mapping) and then BCTS auctions the sale.

The CMA indicates that NWSF will carry out all strategic and operational planning, in keeping with government policy. BCTS reviews the development deliverables, to ensure consistency with the FSP, safety, and operability, and formats the information into a BCTS timber sale licence package. BCTS has confirmed with NWSF that blocks are in fact being developed in compliance with Old Growth Retention Targets for Non-spatial Landscape Units.

6.4 Fish

Consistency with the objectives for fish within riparian areas is achieved through results and strategies that are provided in section CHS 214 of the FSP.

- Any streams with a gradient of less than 20% are considered fish bearing and treated as such, unless a known barrier exists or a fish inventory has indicated that fish are not present.
- Appropriate retention levels/ buffer are prescribed by a qualified professional as required and specified in a plan.
- Riparian classification is determined by section 47 of FPPR

6.5 Biodiversity

Consistency with the objectives for biodiversity is achieved through results and strategies that are provided in sections CHS 215 – 220 of the FSP.

The following strategies are in place to help address biodiversity:

- Deciduous management stocking are now included.
  - Deciduous has been added as an acceptable species in some standards to allow for a deciduous component in regenerated stands
  - Deciduous improves nitrogen fixation, and provides increased habitat features for wildlife.
- Standards were designed to include as many suitable species as possible to increase plantation diversity.

6.6 Cultural Heritage Resources

Consistency with the objectives for cultural heritage resources is achieved through results and strategies that are provided in sections CHS 221 – 223 of the FSP.

Cultural Heritage Resources (CHR) Performance Measures:

- Annual (at minimum) information sharing with First Nations to determine if any CHR exist in proposed areas
- Complete assessments as requested (eg. AOA, AIA, etc.)
- Completed information sharing summary for each OP shared
- Completed assessments as agreed with identified by First Nations (eg.TUS, HFR, Botanical Resources etc.)
- A clause has been included in the TSL that indicates “If previously unidentified features are located, that have not been managed for, under our Environmental Management System, operations must cease until such time as a decision on how to proceed is made by a qualified professional.”

6.7 Recreation Resources

For recreation sites and trails that are legally established, as per section 57 of FPRA and Part 3 of *Forest Recreation Regulation*, BCTS will follow the same protocol used in our information sharing process with all stakeholders.

For recreation sites and trails that are not legally established BCTS will follow the same protocol with regard to information sharing and work with stakeholders to mitigate impact to the resource where practicable.

Performance Measures

- BCTS has successfully completed timber sale licences including measures for:
  - preservation of mountain bike trails and hiking trails (SORCA)
  - timing restrictions, advance notice, temporary trail closures, (SORCA)
  - Paragliders, and all other types of stakeholders have been identified and are working with us to protect, preserve and rehab existing features post-harvest.

6.8 Visual Quality

BCTS will complete VIAs in areas covered by an established VQO, as well as in other areas where visuals are a concern for stakeholders.

With our operating area being in such close proximity to Squamish, stakeholders often request a VIA to ensure that their concerns are being addressed. The Visual Landscape Design Training Manual is referenced when designing and completing the assessments.

7. Additional Information

7.1 Climate Change

BCTS recognizes that climate change is an important issue. Some stocking standards have been modified to incorporate climate change information (e.g. inclusion of Larch as a trial species). At this time BCTS is awaiting more guidance from provincial experts on climate change stocking standards including where and when to put them into effect.

BCTS will continue to implement Seed Transfer guidelines to move species in a more targeted fashion and look at hardwood management (deciduous management stocking standards have been proposed) as a means to mitigate climate change and species amplitude.

Monitoring will also continue for invasive plant spread as risk will continue to increase given their ecological amplitudes.

7.2 Forest Health

BCTS commits to reviewing strategies, and surveys to determine forest health trends in the area covered by this FSP. Using this information, qualified professionals will assess forest health, prescribe and document appropriate strategies, as required. The following list is an example of species that would be considered when assessing forest health:

- Western Spruce Budworm
- Hemlock dwarf mistletoe (Arceuthobium spp.)
- Phellinus weirii

- Armillaria
- Spruce Bark Beetle
- Douglas fir beetle
- Spruce Weevil (* endemic levels still present in Sea to Sky, though Chilliwack is experiencing higher than endemic levels of this concern)

7.3 Fire/Fuel Management

There is information around fire and fuel management, but currently, there are no district policies in place. Qualified professionals take the information into account when they create site plans with the long term objective of timber production. Stocking standards specifically geared at fire/fuel management may be developed using documents like the "Fire Management Stocking Standards Guidance" (dated Feb 2016).

As mentioned in section 3.1 of this document, BCTS has not included any specific stocking standards for fire management.

Hazard abatement is included in our TSLs, and requires that a qualified professional sign off indicating the hazard has been abated. If there is a disagreement about the assessment we can bring the assessment forward to Wildfire Management Branch and they can assess, and have the ability issue an abatement order as required.

7.4 Measures to Prevent the Introduction and Spread of Invasive Plants

The requirement for Invasive Plant (IP) management comes from the FRPA and through 3rd party certification requirements of the SFI Standard.

Since the original inception of the invasive plant FSP measure, BCTS Chinook has gained significant insights into how best to control the introduction and spread of not only IPs listed under the *Invasive Species Regulation*, but all IPs. It is important from a legal perspective that those reading this 'Measure' understand that only plants listed under the *Invasive Species Regulation* are the responsibility of the forest sector to manage.

The new learnings lead to the development of the Chinook Business Areas Invasive Plant BMP. The backbone of the Chinook BMP and now the new IP 'Measure' is defined as, "the use of an appropriate seed mix to seed disturbed soils so that site occupancy is not available for invasive plants".

BCTS Chinook's SFI 3rd party certification also requires that signatories to its 'Standard' deal with IP so as to protect natural ecosystems. For example, Principle #2 "Forest Productivity and Health", states and a number of underlying Performance Measures and Indicators require signatories to protect forests from invasive exotic plants. (Specifically Performance Measures 1.2, 2.4)

8. Stocking Standards

8.1 How Climate Change, Fire Management and Forest Health have been addressed.

BCTS has reviewed climate change reports and guidance and have incorporated trial species into the stocking standards, increased the number of acceptable species to promote and increase in biodiversity and have allowed for a small component of deciduous in some standards.

Fire management standards will be prescribed on a block specific basis to ensure the best result.

An increased variety of species including deciduous are included as acceptable to help address species specific forest health concerns, and promote more diverse stands.

8.2 Rules for modifying Stocking Standards

The following list of rules will be used by qualified professionals when prescribing a stocking standard for a block. They indicate the process and criteria for modifications to an approved standard, and also require that these modifications be supported by a rationale, documented and incorporated into a plan.

Rule 1. Site Series Mosaics/Complexes

Where more than one site series is located within a logical standards unit area, the dominant site series standard will apply (minimum size of 1 hectare).

For specific areas of the mosaic or complex, the standard can be modified to include additional species selected from subdominant site series standard. These additional components to the standard will be supported by a rationale, documented and incorporated into a plan.

Rule 2. Transitional Sites

On transitional sites occurring between two BEC units, the dominant BEC unit standard will apply. This standard can be modified with the inclusion of components of the standard associated with the sub-dominant BEC unit.

These additional components to the standard will be supported by a rationale, documented and incorporated into a plan.

Rule 3. Minimum Intertree Distance (MITD)

The general MITD of 2.0 metres can be reduced down to 1.5 metres for any given site where productive and plantable sites are limited by pre-harvest site characteristics. These can include, but are not limited to: colluvium, overstory canopy, hygric and subhygric sites. Justification for a reduced MITD will be supported by a rationale, documented and incorporated into a plan.

Rule 4. The crop tree height to brush ratio in a fireweed complex can be lowered to 100% for Fd and Pl and 80% for all other species. Justification for a reduced ratio will be supported by a rationale, documented and incorporated into a plan.

Rule 5. Leave Trees

The minimum characteristics, in order for leave trees to contribute toward the free growing stand, are they must be of good form, health and vigour and otherwise meet the stocking standards for that site.

In situations where leave trees will not contribute to the free growing stand, the leave trees within the harvest area must have characteristics appropriate to meet forest management objectives developed for the site.

The forest management objectives must be supported by a rationale, documented and incorporated into a plan.

Rule 6. Western Larch Range Expansion LR2

Western Larch can be considered an acceptable species in the D'Arcy area of the Sea to Sky Natural Resource District. Densities are to be limited to 200 stems per hectare or less on the mid to lower South facing slopes away from major waterbodies in the LW1 Seed Planning Zone (as per attached map and announcement in FSP appendix 1)

Rule 7. If the strategy is to manage for hardwoods (Dr, Ep, Mb), refer to the Hardwood Management Ecology Guide Appendix 2 for BEC and site series where hardwood management may be applied.

Definitions:

Fd = douglas fir	Dr= red alder
Pl = lodgepole pine	Ep = birch
	Mb = bigleaf maple

APPENDICES

Sustainable Forest Management:

https://www.for.gov.bc.ca/ftp/HBT/external/!publish/Web/EMS2/BCTS-Provincial-SFM-Plan.pdf

Chinook Invasive Plant BMP

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Updated Oct 31, 2011 to update banned seed types

BCTS Chinook Invasive Plant Best Management Practice (BMP)

Update(s): BMP revised May 6, 2011 to reflect ministry name change and a rewording of sections to enhance clarity of understanding.

Operating areas covered by the Chinook Invasive Plant BMP

1. BCTS Operations in the Chilliwack, Squamish, and Haida Gwaii Forest Districts
2. BCTS Operations in TFL's within the 3 districts noted above
3. Any other land tenure in which BCTS operates as a forest land management partner with 3rd party entities; e.g., community forests

Reference sources for BMP development

This BMP reflects the best science and information to date related to controlling the spread and/or introduction of invasive plants. Knowledge used to guide the development of this BMP is based upon information obtained from the Invasive Plant Council of BC (IPCBC) and from the Ministry of Forests, Lands and Natural Resource Operation's Invasive Plant program (MFLNRO).

Legislative and policy requirements concerning Invasive Plants

BCTS Chinook's requirement to manage for invasive plants is driven by two impetuses:

1. Forest and Ranges Practices Act and related Invasive Plant Regulation
2. 3rd party certifications via the Sustainable Forestry Initiative and the Forest Stewardship Council

Primary Objective of Invasive Plant BMP

1. To stop the spread and introduction of Invasive Plants to meet our legal and 3rd party certification obligations
2. To educate the staff and Licensees, Permittees, and Contractor about how to stop the introduction and/or spread of invasive plants

Limitations to the control of the introduction and/or spread of Invasive Plants

Due to the extent of existing populations of invasive plants within BCTS' operating areas it is not possible or prudent to attempt to manage for the introduction and spread of all invasive plants on a species by species basis. Though the guidance of expert advice available on the IPCBC web site and through consultation with invasive plant experts in MFLNRO, BCTS Chinook is taking a 2 pronged approach:

1. That the control of the introduction and spread of invasive pants is best managed though the occupation of newly disturbed soils; i.e., potential seed beds, that could be used by invasive plants to become established or used to spread, with agronomical suitable grass seed '*sodgrass*' mixture(s)
2. That as experience with invasive plants and their autecology continues to increase, that grass seeding efforts will focus solely on protecting Sensitive Sites[1]. These Sensitive Sites equate to:

- Riparian areas, lake, wetlands, bogs
- Wildlife habitat areas (WHAs)
- Endangered ecosystems; e.g., Garry oak complexes
- Ungulate winter ranges
- Areas of FN spiritual use/plant collection
- Culturally significant areas; parks and ecological reserves
- Other areas as defined by 'experts' and/or stakeholders

[1]Sensitive Sites equates to sites classified as '*Extremely High Risk to invasive plants*' in the Chinook Chilliwack FSP

Foundation of the Chinook BA's Invasive Plant BMP

Noting the extensive range and diversity of invasive plants in Chinook's operating areas the Chinook BA is focusing on eliminating the potential for IP spread via grass seeding disturbed soils to manage the introduction and/or spread of invasive plants. Legally the Chinook BA is only required to manage for invasive plants as identified in the Forest and Range Practices Act (FRPA) Invasive Plant Regulation but, through the removal of potential seed bed via grass seeding it is felt that this method will limit the introduction and/or spread all invasive plants that could threaten Sensitive Sites.

It is also understood that very few invasive plants can thrive under a closed canopy situation where light is limited therefore there is no need to grass seed any portions of a forest operations that will see a closed canopy established either naturally or artificially post disturbance unless there is an adjacent IP that can thrive in closed canopy conditions.

Where to grass seed

Grass seeding should occur under the following conditions:

1. Invasive plants are within the vicinity of proposed operations and when these operations will **create new disturbed soil**. The target areas for grass seeding in this case relates to new construction activities:
    a. building new roads into the forested land.
    b. Building new structures; bridges, etc.,
2. When invasive plants are present and, based upon their autecology, they pose a risk to a sensitive site. In this situation road activities; construction or maintenance, will create seed bed(s) that can act as a vector for the spread of invasive plants by:
    a. Creating a new seed bed (disturbed soil) that can act as a vector for the spread of invasive plants along the newly disturbed soil, or
    b. Moving reproductive material from an existing location to a new location **that will pose a risk to a Sensitive Site**.
3. When undertaking activities immediately adjacent to any Sensitive Site

Where grass seeding is not required

BCTS and/or its Licensees, Permittees and Contractors do not have to grass seed when operational activities are occurring an area where invasive plants are well established and activities will not spread invasive plants into new areas.;

Example grass seeding scenarios

1. A TSL Holder **is building a new road** into a proposed block location off of an existing mainline with established invasive plants along the mainline network and his tenure requires that he maintain the existing road:
    a. The Licensee **must grass seed** where the new construction has occurred
    b. The Licensee **does not have to grass seed** along the mainline if none of the existing invasive plants pose a risk to a Sensitive Site based upon their autecology. In this case, even though grading, etc can create new disturbed soil (seed beds) because the invasive plants have already been established along the mainline in essence the activities are not introducing or spreading the invasive plants, rather, there may simple be a redistribution of existing IPs along an already infested corridor.
2. A TSL Holder is using an existing mainline to access his timber. Under his permit/road tenure he is required to maintain the road including grading, culvert maintenance, etc, **but there will be no new construction activities**. There are established invasive plants along the mainline but none that pose a risk to a Sensitive Site based upon their autecology. In this case, even though grading, etc can create new disturbed soil (seed beds) because the invasive plants have already been established along the mainline in essence the activities are not introducing or spreading the invasive plants rather, there may simple be a redistribution of existing IPs along an already infested corridor.
3. A Contractor is replacing a bridge along a mainline and the mainline has established invasive plants along it. One of the invasive plants that has already become established along a portion of the mainline **poses a threat to riparian habitat** based upon its autecology. The contractor **must grass seed the new disturbed soil related to the bridge replacement project**. The reason for the need to grass seed is because the bridge construction activities are creating new disturbed soil immediately adjacent to a Sensitive Site. The prudent step is to grass seed the construction site to ensure that the problematic invasive plant will not be given an opportunity to move down the road through the new bridge related construction and enter into the riparian habitat.

Future direction of grass seeding

As individuals responsible for developing operational plans become more comfortable with the identification and related autecology of invasive plants, and with the identification of Sensitive Sites, grass seeding will only be required when there is the possibility that an activity will create a situation where invasive plants can spread into the Sensitive Site. Until such time, grass seeding will be required to be done as per the direction and clarifications above.

This BMP will be updated to reflect this future direction at such time as it is felt that the understanding of plant identification and autecology, and Sensitive Site identification, are sufficient to ensure that there is a minimal risk to the Sensitive Sites.

Timing of grass seed application

- Grass seeding should occur at a time that is conducive to grass seed establishment. The spring and fall seasons are the best times when there is the least likely risk of moisture deficit but spring seeding is preferred
    - Grass seeding should occur prior to seed development by invasive plants in the vicinity of operations

General rules concerning the type of grass seed mix to use

- Minimum grass seed standard in the Chinook BA is a seed that will meet or exceed '*Canada Common Number 1 Forage*' mixture specifications as defined by the Canada Seeds Acts; sodgrass mixtures are mandatory in the Chinook BA
    - When ordering seed be sure to specify if you are seeking a coastal seed mix or an interior seed mix
        - Example interior operating areas include:
            - Squamish Forest District: Pemberton and points north and east
            - Chilliwack Forest District: Spuzzum and points north and east
- use *sodgrasses* for erosion control, restoration works, or to occupy disturbed soils (seed beds) within close proximity to established invasive plant populations.
- for erosion control & restoration planned in areas free of invasive plants then agronomic *bunchgrasses* allow for native vegetation to in-fill (between the bunches).
- The section below "Appropriate Seed Mix" lists the latest recommendation for seed mixes based upon biogeoclimatic zones (BEC). These mixtures can be more expensive and harder to come by but will provide an overall better ecological result and should be used where practicable.
- Below is also a listing of banned seed **that must be adhered to** due to their invasive qualities or other environmental risks they pose.
- Suggested seeding rate: 50 kg/ha
- Suggested fertilization rates: 250 kg/ha

Licensees Permittees and Contractors obligations

1. Always grass seed as per examples above if creating disturbed soil unless otherwise directed in Site Plans or by ministry staff
2. Ensure that you are fully appraised of invasive plants within your proposed area of operations by your ministry representative during pre-works
3. Ensure that you are fully appraised of your grass seeding requirements by your ministry representative during pre-works

4. Follow the scenarios above to understand where grass seeding should occur if not discussed at your pre-work(s) and/or documented with Site Plans; harvesting and/or road construction, prepared for your activity.
5. Ensure that your staff are fully aware of problematic invasive plants and any grass seeding requirements
6. Review T.I.P.S. on the Invasive Plant Council of BC web site prior to undertaking any operations.
    a. http://www.invasiveplantcouncilbc.ca/publications/TIPS/Forestry_Oper_TIPS.pdf

General Steps for Managing Invasive Plants

1. For a specific area, prior to development activities occurring, use the IAPP map display program to note the last known location for IPs.

2. Survey the area to determine if the IPs have spread further and/or if there are additional species that have not been identified that extend beyond the last known location of IP occurrence. If the IP has spread or if there are new IPs beyond this 'known' location, record their location, population size, etc and then report back to the IAPP application (the 22 priority plants listed on the carabineers are the ones that must be reported to the IAPP database using the "Report-A-Weed" tool). This sets the baseline for BCTS to ensure that plants do not spread further. This is also sets the point beyond which our legal obligations commence.

3. For the IPs that are found consider their form of spread; see Appendix C, which provides the mechanism of spread by plant, as well as, a link to learn more about the plant's autecology. Once you understand the form of spread then consider, if possible, aligning operations to occur in a time or way that is less likely to spread the plant.

Consider the plant survival triangle; form of spread, suitable seed bed, nutrients and light. Target activities that will eliminate one or more sides of the triangle and the plant will not spread; e.g. eliminate seed bed(s) by grass seeding and monitoring, or, out competing the IP plant for water and nutrients by using suitable sodgrass seed mix(s).

4. Where grass seeding has taken place ensure that there is a suitable monitoring strategy/plan in place for the next growing season(s) to ensure that the grass seed has established.

5. For more detailed information concerning Invasive Plant management review the Chinook Invasive Plant Process map and related SOP

- Internal staff: https://www.for.gov.bc.ca/bcts/areas/TCH/TCH_ems-internal.htm
- External contractors and LPC's: http://www.for.gov.bc.ca/ftp/TCH/external/!publish/EMS2/Supplements/

Chinook BA IP BMP effectiveness monitoring

Roads: Integral to the road maintenance activities is the requirement to monitor to ensure that any grass-seeding that has occurred has been successful. Where grass seeding has failed additional grass

seeding will take place. Any additional spread of IP's will be noted and reported through the "Report-A-Weed" tool on the IAPP web site. The requirement to monitor grass seeding or follow-up treatments is scheduled in Cengea.

Silviculture:

Silviculture activities play a limited role in stopping the spread of IPs. The primary objective is to ensure that plantations reach "free-growing" status within legislated timelines and as the plantation grows IPs are outcompeted for sunlight and nutrients and their spread is halted. During surveys any new locations of IPs are recorded and reported through the "Report-A Weed" tool of the IAPP web site.

Where to go for additional information

1. The Invasive Plant Council of BC has great resources on their web site and it should be referred to on an ongoing basis. Below is a link to the Invasive Plant Council of BC T.I.P.S. (Targeted Invasive Plant Solutions) for Invasive plants and forestry operations. You may want to give this link to contractors during pre-works.
   http://www.invasiveplantcouncilbc.ca/publications/TIPS/Forestry_Oper_TIPS.pdf

2. The *Global Invasive Species* database is a new database that was created with the aim of increasing awareness about invasive alien species and to facilitate effective prevention and management activities. It is managed by the Invasive Species Specialist Group of the Species Survival Commission of the IUCN – World Conservation Union.
   http://www.issg.org/database/welcome/

Appendix A: Appropriate Seed Mixes by BEC

BEC Zone	Recommended Native Seed Mixture Constituents	Recommended Agronomic Seed Mixture Constituents
IDFww	➢ **Junegrass**[B] ***Koelaria macrantha*** ➢ **Rocky Mountain fescue**[B] ***Festuca saximontana*** ➢ **Idaho fescue**[B] ***Festuca idahoensis ssp. idahoensis***	➢ **Annual rye**[B] ***Lolium multiflorum*** ➢ **Perennial rye**[B] ***Lolium perenne*** ➢ **Hard fescue**[B] ***Festuca trachyphylla*** ➢ Red fescue[S] *Festuca rubra*
CDFmm *(Garry Oak Ecosystems only)*	➢ **Roemer's fescue**[B] ***Festuca idahoensis ssp. roemeri*** ➢ **California oatgrass**[B] ***Danthonia californica*** ➢ **California brome**[B] ***Bromus carinatus*** ➢ **Blue wildrye**[B] ***Elymus glaucus*** - No legumes to be included	N/A
CDFmm *(excluding Garry Oak Ecosystems)*	➢ **California brome**[B] ***Bromus carinatus*** ➢ **Blue wildrye**[B] ***Elymus glaucus*** ➢ **Native red fescue**[S] ***Festuca rubra ssp. arenicola*** ➢ Canada bluegrass[S] *Poa compressa* ➢ Spike bentgrass[S] *Agrostis exarata* ➢ Hair bentgrass[B] *Agrostis scabra* ➢ Slimstem reedgrass[B] *Calamagrostis stricta* ➢ Tufted hairgrass[B] *Deschampsia cespitosa* ➢ Slender hairgrass[B] *Deschampsia elongate*	➢ **Red fescue**[S] ***Festuca rubra*** ➢ **Red top**[S] ***Agrostis gigantea*** ➢ **Perennial rye**[B] ***Lolium perenne*** ➢ **Annual rye**[B] ***Lolium multiflorum*** ➢ Alsike clover[L] *Trifolium hybridum* ➢ Red clover[L] *Trifolium pratense* ➢ White clover[L] *Trifolium repens*
CWH "dry" (subzones: xm, ds, dm, ms, mm, ws)	➢ Same as immediately above, except: 1. Replace **California brome** ***Bromus carinatus***[B] with **Alaska brome**[B] ***Bromus sitchensis*** 2. On wet sites, **Alaska brome**[B] ***Bromus sitchensis*** is reduced to 25% by weight and Tufted hairgrass[B] *Deschampsia cespitosa* is increased to 10% by weight.	➢ **Red fescue**[S] ***Festuca rubra*** ➢ **Red top**[S] ***Agrostis gigantea*** ➢ **Perennial rye**[B] ***Lolium perenne*** ➢ **Annual rye**[B] ***Lolium multiflorum*** ➢ Alsike clover[L] *Trifolium hybridum* ➢ Red clover[L] *Trifolium pratense* ➢ White clover[L] *Trifolium repens*
CWH "wet" (subzones: wm, vm, wh, vh)	➢ Same as immediately above, except: 1. Replace **Native red fescue** ***Festuca rubra***[S] ***ssp. arenicola*** (e.g. 20%) with **Native red fescue** ***Festuca rubra***[S] ***ssp. pruinosa*** (e.g. 20%)	➢ **Red fescue**[S] ***Festuca rubra*** ➢ **Red top**[S] ***Agrostis gigantea*** ➢ Alsike clover[L] *Trifolium hybridum* ➢ Red clover[L] *Trifolium pratense* ➢ White clover[L] *Trifolium repens*
MH (subzones: mm, wh)	➢ **Native red fescue**[S] ***Festuca rubra ssp. pruinosa*** ➢ **Alaska brome**[B] ***Bromus sitchensis*** ➢ **Blue wildrye**[B] ***Elymus glaucus*** ➢ **Tufted hairgrass**[B] ***Deschampsia cespitosa***	➢ **Red fescue**[S] ***Festuca rubra*** ➢ **Red top**[S] ***Agrostis gigantea*** ➢ Alsike clover[L] *Trifolium hybridum* ➢ Red clover[L] *Trifolium pratense* ➢ White clover[L] *Trifolium repens*

[S] = sodgrass [B]= bunchgrass [L]= Legume

Appendix B: Grass seed species that should not be included in seed mixtures

• Alfalfa *(Medicago sativa)*	• Jointed goatgrass *(Aegilops cylindrical)*
• Annual bluegrass (*Poa annua)*	• Kentucky bluegrass *(Poa pratensis)*
• Barnyardgrass (*Echinochloa crusgalli)*	• Lovegrass (*Eragrostis minor)*
• Bermuda grass *(Cynodon dactylon)*	• Meadow foxtail *(Alopecurus pratensis)*
• Birdsfoot trefoil (*Lotus corniculatus)*	• Perennial peavine *(Lathyrus latifolius)*
• California poppy (*Eschscholzia californica*)	• Purple nutsedge *(Cyperus rotundus)*
• Cheatgrass or Downy brome (*Bromus tectorum*)	• Quack grass (*Elymus repens)*
• Colonial bentgrass or Brown top *(Agrostis capillaris)*	• Queen Annes Lace *(Daucus carota)*
• Couchgrass *(Elymus repens)*	• Reed canary grass (*Phalaris arundinacea*)
• Creeping bentgrass *(Agrostis stolonifera)*	• Scentless chamomile (*Matricaria maritima*)
• Crested wheatgrass *(Agropyron cristatum)*	• Shasta daisy *(Leucanthemum x superbum)*
• Dames rocket *(Hesperis matronalis)*	• Silver hairgrass (*Aira caryophyllea)*
• Dandelion *(Taraxacum officinale)*	• Smooth brome (*Bromus inermis*)
• Fall rye *(Secale cereale)*	• Soft brome (*Bromus hordeaceus)*
• False brome *(Brachypodium sylvaticum)*	• Subterraneum Clover *(Trifolium subterraneum)*
• Flat pea *(Lathyrus sylvestris)*	• Sweet vernalgrass (*Anthoxanthum odoratum)*
• Foxglove (*Digitalis purpurea)*	• Timothy (*Phleum pratense)*
• Foxtail barley *(Hordium jubatum)*	• Velvetgrass (*Holcus latatus*)
• Golden clover *(Trifolium aureum)*	• White sweetclover (*Melilotus alba)*
• Green bristle grass *(Setaria viridis)*	• Wild oats (*Avena fatua*)
• Green foxtail (*Setaria viridis*)	• Wild proso millet (*Panicum miliaceum*)
• Hairy vetch *(Vicia villosa)*	• Yellow hairgrass *(Aira praecox)*
• Hedgehog dogtail (*Cynosurus echinatus)*	• Yellow nutsedge *(Cyperus esculentus)*
• Johnsongrass *(Sorghum halpense)*	• Yellow sweetclover *(M elilotus officinalis)*

**species listed above are either invasive, too persistent, attract wildlife (forage), a wildfire hazard or have been proven to provide minimal cover*

Appendix C: Road and road management activities

The spread of invasive plants and noxious weeds is a significant issue in projects that involve soil disturbance. Earth moving activities contribute to the spread of weeds through movement of seeds and propagules contained in transitory soils. Prevention is the least expensive and most effective way to halt the spread of such plants. The three pillars of prevention for earth moving projects include:

1. Education of workers about the importance of managing weeds on an ongoing basis.

- Properly identify priority plants - training, brochures etc.
- Ensure that they know where the high risk sites are (i.e. sites that that you aim to protect)
- Ensure that they understand that storage areas, equipment yards and gravel pits are staging areas for IPs
- Actively use IAPP Application to record and monitor priority plants - it can be as simple as entering the species code, the area of the infestation (ha), location (UTM easting/northing and zone), density and distribution codes.
- Encourage staff to forward their ideas about measures that can be incorporated into future projects and strategic plans that prevent seeds or propagules from spreading and establishing new or bigger populations.

2. Prevention practices - minimizing the spread by controlling seed and/or plant part dispersal vectors:

- Where possible, avoid moving weed-infested gravel, rock and other fill materials to relatively weed free locations.
- Inspect and clean equipment of plant seed or propagules from clothing and/or equipment by dislodging and containing associated water, mud and dirt at designated cleaning stations or in the field (e.g. excavator operators can get most of the dirt from undercarriages, if they have been working among infestations, by spinning the machine 90 degrees, dropping a blade to elevate one track. He can then spin his track to remove the bulk of the material and use a narrow trenching shovel to remove the remainder. Repeat the process for the other track. Localize accumulations for ease of future treatment.)
- Keep roadside infestations away from road surfaces so that seeds and plant parts are not inadvertently transported by vehicles and equipment.
- Maintain soil, subgrade or surfacing material that is being moved during road construction as free of weeds as possible.
- Promptly re-vegetate disturbed areas adjacent to, or known to be at risk from priority IP establishment using an appropriate combination of scarification, grass seeding (native seed or a coastal agronomic seed that is a grade of Common #1 Forage Mixture or better), fertilizer, and/or mulch.

Appendix D

Chinook 22 priority plants for reporting to IAPP database are indicated with highlighted text; e.g., Common tansy

Invasive Plant Species	***Scientific name***	**Spread mechanism**	**Habitat at Risk**	**Control: (Seed disturbed areas at all times excluding plantations.)**	**Web Link**
Anchusa	*Anchusa officinalis*	seed	dry open areas incl. fields and range areas	pull before seed set; competitive perennial seed	http://www.agf.gov.bc.ca/cropprot/weedguid/bugloss.htm
Baby's breath	*Gypsophila paniculata*	seed	dry open areas incl. fields and range areas	pull before seed set; competitive perennial seed	http://www.agf.gov.bc.ca/cropprot/weedguid/babysbreath2.htm
Black knapweed	*Centaurea nigra*	Primary - seeds; occasionally from root shoots	wide array of disturbed sites including riparian areas, range/pastures and cut blocks	small pops - pull/ large pops - mow and herbicide emerging seedlings; competitive perennial seed	http://www.weedsbc.ca/demo/pdf/black_knapweed.pdf
Blueweed	*Echium vulgare*	seeds	pastures/rangelands	small pops - pull/ large pops - herbicide; competitive perennial seed	http://www.weedsbc.ca/pdf/blueweed.pdf
Brown knapweed	*Centaurea jacea*	seeds and woody root crown	range and open areas incl open forests	small pops - pull/ large pops - herbicide; competitive perennial seed	http://www.nwcb.wa.gov/weed_info/Written_findings/Centaurea_jacea.html
Bull thistle	*Cirsium vulgare*	seeds	open disturbed areas	cutting and mowing prior to 'bolting'/competitive perennial seed.	http://www.weedsbc.ca/weed_desc/bull_thistle.html#
Canada thistle	*Cirsium arvense*	seeds/roots	open disturbed areas and riparian areas	herbicide, competitive perennial seed	http://www.weedsbc.ca/weed_desc/canada.html

Invasive Plant Species	***Scientific name***	**Spread mechanism**	**Habitat at Risk**	**Control: (Seed disturbed areas at all times excluding plantations.)**	**Web Link**
Common burdock	*Arctium minus*	seeds	disturbed areas incl roadsides and riparian areas also range	mow after 'bolting' but prior to seed set. Eliminate seed bed. Can use herbicide.	http://www.weedsbc.ca/pdf/common_burdock.pdf
Common tansy	*Tanacetum vulgare*	seed/root	disturbed areas incl roadsides and riparian areas also range	Cutting and mowing in conjunction with other techniques as also spreads by roots	http://www.weedsbc.ca/pdf/common_tansy.pdf
Dalmatian toadflax	*Linaria dalmatica*	seed/root	disturbed areas incl roadsides and range/pasture	small pop - hand pull before seed set. Use competitive perennial seeding	http://www.weedsbc.ca/pdf/dalmation_toadflax.pdf
Diffuse knapweed	*Centaurea diffusa*	seed	disturbed areas incl roadsides and range/pasture	hand pulling/herbicides	http://www.weedsbc.ca/pdf/diffuse_knapweed.pdf
Field scabious	*Knautia arvensis*	seed	ditch lines and disturbed areas impacting range/pasture	small pop - hand pull before seed set. Larger pop - cut/mow before seed set	http://www.weedsbc.ca/pdf/field_scabious.pdf
Giant knotweed	*Polygonum sachalinense*	rhizomes and root fragments/seed	riparian areas and road sides, R/W	do not create opportunity to spread.	http://dnr.metrokc.gov/wlr/lands/weeds/pdf/Knotweed-Control.pdf
Gorse	*Ulex europaeus*	seed	disturbed areas incl. roadsides and plantations	burning/mowing then herbicide	http://www.weedsbc.ca/pdf/gorse.pdf
Hoary alyssum	*Berteroa incana*		disturbed sites impacts range pasture	hand pull before seed set. Herbicide	http://www.weedsbc.ca/pdf/hoary_alyssum.pdf
Hoary cress	*Cardaria draba*	seed/root	disturbed sites incl. roadsides also pasture/range	herbicide/competitive perennial seed seeding	http://www.weedsbc.ca/pdf/hoary_cress.pdf

Invasive Plant Species	***Scientific name***	**Spread mechanism**	**Habitat at Risk**	**Control: (Seed disturbed areas at all times excluding plantations.)**	**Web Link**
Hound's-tongue	*Cynoglossum officinale*	seed	disturbed soils especially pastures, cut blocks; prefers alkaline soils	hand pull small pops; mow before bolts, herbicide	http://www.weedsbc.ca/pdf/hounds_tongue.pdf
Japanese knotweed	*Polygonum cuspidatum*	Primarily reproduction is vegetative through long creeping rhizomes or by root fragments,	wetland/riparian and wet moist low lying areas	herbicide	http://www.agf.gov.bc.ca/cropprot/weedguid/jknotweed2.htm
Leafy spurge	*Euphorbia esula*	seed but primarily roots	rangeland	herbicide/ competitive perennial seeding	http://www.weedsbc.ca/pdf/leafy_spurge.pdf
Marsh (plume) thistle	*Cirsium palustre*	seed	pasturelands, plantations/moist to wet areas, riparian areas	hand pull small pops; mow before flowering/competitive perennial seeding	http://www.weedsbc.ca/weed_desc/marsh.html
Meadow hawkweed	*Hieracium pilosella*	seed, stolons, rhizomes	riparian areas, pastures, plantations	herbicides, grazing, competitive perennial seeding	http://mtwow.org/meadow-hawkweed-complex.html
Meadow knapweed	*Centaurea pratensis*	seed	rangeland/pastures	hand pull small pops; mow then herbicide new growth	http://www.weedsbc.ca/weed_desc/meadow.html
Nodding thistle	*Carduus nutans*	seed	rangeland/pastures/plantations	herbicide/ hand pull small pops.	http://www.weedsbc.ca/pdf/nodding_thistle.pdf
Orange hawkweed	*Hieracium aurantiacum*	vegetatively via stolons	pastures/rangelands	herbicide/competitive perennial seed, minimize disturbed soil.	http://www.weedsbc.ca/pdf/orange_hawkweed.pdf

Invasive Plant Species	***Scientific name***	**Spread mechanism**	**Habitat at Risk**	**Control: (Seed disturbed areas at all times excluding plantations.)**	**Web Link**
Oxeye daisy	*Chrysanthemum leucanthemem*	seeds and vegetatively via roots	pastures/rangelands	herbicide/fertilizer/competitive perennial seed	http://www.weedsbc.ca/pdf/oxeye_daisy.pdf
Perennial pepperweed	*Lepidium latifolium*	seeds and vegetatively via roots	riparian areas, marshy floodplains, seasonally wet areas; pastures/meadows	mowing/burning/hand pull before seed set.	http://www.weedsbc.ca/pdf/perennial_pepperweed.pdf
Plumeless thistle	*Carduus acanthoides*	seed	pastures	herbicide; mow to eliminate seed production	http://www.weedsbc.ca/pdf/plumeless_thistle.pdf
Puncture vine	*Tribulus terrestris*	seed (burrs)	pasture/recreation areas	herbicide/competitive perennial seed	http://www.weedsbc.ca/pdf/puncturevine.pdf
Purple loosestrife	*Lythrum salicaria*	seeds, vegetatively by roots; also root and stem fragments	riparian areas, wetlands, streams, ponds	hand pull small pops but must get all of root/herbicide	http://www.weedsbc.ca/pdf/purple_loosestrife.pdf
Rush skeletonweed	*Chondrilla juncea*	seeds, vegetatively by roots	pastures, rangeland, meadows	hand pulling, cutting to prevent seed-set and herbicides	http://www.weedsbc.ca/pdf/rush_skeletonweed.pdf
Russian knapweed	*Acroptilon repens*	primarily vegetatively; possibly by seed	pastures, rangeland, meadows, plantations	mowing/cutting and herbicide	http://www.weedsbc.ca/pdf/russian_knapweed.pdf
Scentless chamomile	*Matricaria maritima*	seed	range, pastures; riparian and wetland areas and areas subject to seasonal flooding	hand pulling; early and frequent mowing; herbicide, competitive perennial seed.	http://www.weedsbc.ca/pdf/scentless_chamomile.pdf

Invasive Plant Species	***Scientific name***	**Spread mechanism**	**Habitat at Risk**	**Control: (Seed disturbed areas at all times excluding plantations.)**	**Web Link**
Scotch broom	*Cytisus scoparius*	seed	plantations, pastures. range	hand pull but must get all of stump and roots/ mow while flowering; minimize disturbed soils; competitive perennial seed	http://www.evergreen.ca/en/cg/pdf/invasive/scotchbroom_factSheet.pdf
Scotch thistle	*Onopordum acanthium*	seed	range/pastures/crop land	herbicide before bolting or in fall on rosettes	http://www.weedsbc.ca/pdf/scotch_thistle.pdf
Spotted knapweed	*Centaurea biebersteinii*	seed	range/pastures	hand pull small pops but get all of root; herbicide; competitive perennial seed	http://www.weedsbc.ca/pdf/spotted_knapweed.pdf
St. John's wort	*Hypericum perforatum*	seed and via vegetatively from roots	range, pastures and meadows.	herbicide; seed with perennial grasses and forbs	http://www.weedsbc.ca/pdf/st_johns_wort.pdf
Invasive Plant Species	***Scientific name***	**Spread mechanism**	**Habitat at Risk**	**Control: (Seed disturbed areas at all times excluding plantations.)**	**Web Link**
Sulphur cinquefoil	*Potentilla recta*	seed and via vegetatively from roots	range, pasture, grassland	herbicide; seed with perennial grasses and forbs; also cultivation	http://www.weedsbc.ca/pdf/sulphur_cinquefoil.pdf
Tansy ragwort	*Senecio jacobaea*	seed	pasture, hayfields, clear cuts	mowing, herbicides and competitive perennial seed	http://www.weedsbc.ca/pdf/tansy_ragwort.pdf
Teasel	*Dipsacus fullonum*	seed	disturbed sites	cutting/digging/burning; herbicide	http://dnr.wi.gov/invasives/fact/teasel_com.htm

Invasive Plant Species	***Scientific name***	**Spread mechanism**	**Habitat at Risk**	**Control: (Seed disturbed areas at all times excluding plantations.)**	**Web Link**
Yellow iris	*Iris pseudacorus*	underground rhizomes; seed	streams, wetlands, riparian areas, wet ditches	v. difficult due to location and source of spread. Multiple weedings over number of seasons required.	http://www.evergreen.ca/en/cg/pdf/invasive/yellow%20flag_factSheet.pdf
Yellow starthistle	*Centaurea solstitialis*	seed	rangeland, pastures	mowing, burning, herbicides	http://tncweeds.ucdavis.edu/esadocs/documnts/centsol.pdf
Yellow toadflax	*Linaria vulgaris*	seeds and vegetatively from roots	rangeland, pastures, plantations	competitive perennial seed, mowing, herbicide	http://www.weedsbc.ca/pdf/yellow_toadflax.pdf

Note: Where seed is the mode or spread then control measures should focus on activities that eliminate seed production, eliminate a seed bed, and/or create competition

Vegetative reproduction: a type of reproduction that occurs when a "parent" plant grows new plants from its roots, stems, or leaves

Species At Risk Management Process
Standard Operating Procedure

February 24, 2011

PURPOSE

To define the various steps that are required to occur at different operational stages and identify the individuals who are responsible to undertake these steps to effectively manage and protect Species At Risk (SAR).

SCOPE

This Standard Operating Procedure (SOP) covers all aspects of forestry planning and block/road development, the signing and sealing of the applicable Site Plan, and implementation. It includes relevant business area staff, licensees, and contractors working for BCTS.

Important Information Sites

Conservation Data Centre: This site's Internet Mapping Service (IMap) will be utilized to identify known occurrences of Species At Risk: http://www.env.gov.bc.ca/cdc/access.html

BC Species and Ecosystems Explorer: Species and Ecosystems Search: utilize this site to confirm various Species At Risk and to access reports concerning specific species at risk. This site can also be used to see mapped locations of a specific species: http://www.env.gov.bc.ca/atrisk/toolintro.html

UBC Herbarium: This site contains a database that details the location of known SAR. It only provides written descriptions of locations and latitude and longitudinal information: http://www.beatymuseum.ubc.ca/herbarium/index.html

Recent Changes (Feb. 24, 2011): This SAR SOP has been updated to include reference to using the UBC Herbarium layer in Cengea Resources rather than having to go to the Herbarium website as an additional source for locating known information of rare and endangered plants. References to District SAR listings have been removed.

Note: this SOP is linked to the SAR Process Design Map.

PROCEDURE	RESPONSIBILITY
Stage 1: Block Planning SAR Management	
• Ensure blocks have passed initial economic viability test; i.e. ensure it meets *PP Done* test.	*Planning Forester* *Practices Forester*
• Confirm location of potential cut block and associated road networks	*Practices Forester*

• Check CDC website utilizing *IMap* function to determine if any SAR have been mapped within area of proposed activity
  ○ Record any findings of relevant SAR
  ▪ If necessary complete and submit CDC *Custom Data Request*
	Practices Forester

• Check UBC Herbarium map layer in Resources to determine if any SAR have been mapped within area of proposed activity.
  ○ Record any findings of relevant SAR
  ▪ If necessary complete contact expert in plant ID
	Practices Forester

PROCEDURE	RESPONSIBILITY

• Determine management options for each SAR discovered on CDC IMap website or on UBC Herbarium map layer:
  ○ Discuss with Planning Officer/Forester, Area Forester/Woodlands Supervisor and/or Woodlands Manager to see if there are any previous commitments related to species management; e.g., Phantom orchid, tailed frog, etc., or recommendations provided by Qualified Professional
  ○ If no management recommendations available consult with Qualified Professional
  ▪ discuss Qualified Professional's recommendations with Area Forester/Woodlands Supervisor and Woodlands Manager
	Practices Forester
	Multiphase Forester
	Planning Forester
	Qualified Professional

• Review BA SAR plant, animal, and ecological community listing to determine potential SAR species in area of proposed activity.
  ○ Make list of potential SAR species that could be encountered
  ▪ If uncertain about potential of SAR in area of proposed activity have the area field reviewed by a Qualified Professional.
	Practices Forester
	Multiphase Forester
	Qualified Professional

• Review Chinook plans and policies to determine if there are any pre-existing SFI/EMS SAR commitments in relation to SAR management; e.g., percent Deer Winter Range available for harvest.	*Practices Forester* *Multiphase Forester*
• Update and/or review SAR tracking form and attach to SAR Block Activity in Cengea Resources with other relevant documents and comments	*Practices Forester* *Multiphase Forester*
• Determine if block planning should proceed based upon management recommendations	*Practices Forester* *Multiphase Forester* *Planning Officer*

• During field review collect basic coarse ecological information necessary to assist with use of MOE Species Explorer/TCH SAR database
  ○ BEC, subzone, variant
  ○ Primary forest cover/landscape attributes
• If uncertain about potential SAR prior to field visit engage Qualified Professional during field visit
• Detail any SAR located in field and discuss management options with Area Forester/Woodlands Supervisor, Woodlands Manager and/or a Qualified Professional
• Determine if proposed activity should occur based upon SAR recommendations
	Practices Forester
	Multiphase Forester
	Qualified Professional

Stage 2: Block/Engineering Layout Pre-work (Multiphase)	
• Confirm location of proposed block or road	*Practices Forester* *Multiphase Forester* *Operations Technician*

PROCEDURE	RESPONSIBILITY
• Summarize findings from block planning stage if applicable for handover to multiphase staff/contractor(s)	*Operations Technician*
• Prior to pre-work meeting, check CDC website utilizing *IMap* function to determine if any new SAR have been mapped within area of proposed activity prior to pre-work meeting ○ Record any findings of relevant SAR • If necessary complete and submit CDC *Custom Data Request*	*Multiphase Forester* *Operations Technician*

• Check UBC Herbarium map layer in Resources to determine if any SAR have been mapped within area of proposed activity.
  ○ Record any findings of relevant SAR
  ▪ If necessary complete contact expert in plant ID
	Multiphase Forester
	Operations Technician

• Update SAR tracking form and attach to SAR Block Activity in Cengea Resources with other relevant documents and comments	*Operations Technician* *Multiphase Forester*
• Provide SAR summary to contractor with any SAR management recommendations including those from Qualified Professionals where available	*Operations Technician*

• Discuss how contractors SAR field investigations should be documented
  ○ In site plan under relevant R/S
  ○ As supporting document to Site Plan
  ○ In the SP declaration letter
  ○ Private filing with documentation available upon request
	Practices Forester

• Review capabilities of CDC and MOE "Species Explorer" websites, and UBC Herbarium map layer with contractor; reports, maps, reference material, etc.	*Operations Technician*
• Operations Tech to communicate with multiphase contractor during monthly progress meetings Re: any new SAR found	*Operations Technician*
Stage 3: Field Work Quality Assurance (Inspection)	
• Select blocks for review based on EMS and SAR risks	*Practices Forester*
• Review pre-work (Multiphase) notes and material, including SAR management strategies	*Operations Technician* *Practices Forester*
• Check CDC website utilizing *IMap* function to determine if any new SAR have been mapped within area of proposed activity prior to pre-work meeting ○ Record any findings of relevant SAR • If necessary complete and submit CDC *Custom Data Request*	*Operations Technician* *Practices Forester*

• Check UBC Herbarium map layer in Resources to determine if any SAR have been mapped within area of proposed activity.
  ○ Record any findings of relevant SAR
  ▪ If necessary complete contact expert in plant ID
	Operations Technician
	Practices Forester

PROCEDURE	RESPONSIBILITY
• Check field ecological classification for accuracy to aid in proper identification of potential SAR species/communities	*Operations Technician* *Practices Forester*
• Where uncertain about potential for SAR in proposed area of activity engage Qualified Professional to jointly conduct field review.	*Operations Technician* *Practices Forester* *Qualified Professional*
• Ensure previously identified SAR are adequately managed • Record any new SAR found in field and discuss management recommendations with multiphase Forester/Practices Forester • If uncertain about management recommendations seek input from Qualified Professional	*Operations Technician* *Practices Forester* *Qualified Professional*
• Update SAR tracking form and attach to SAR Block Activity in Cengea Resources with other relevant documents and comments	*Operations Technician* *Practices Forester* *Multiphase Forester*
Stage 4: Site Plan/Road Site Plan Quality Assurance	

• Site Plan prepared by multiphase or in-house
• Site Plans peer reviewed:
  • Review CDC website and UBC Herbarium map layer to check for any new SAR occurrences
  ○ If new SAR found determine management requirements with QP input as deemed necessary
  ○ Refine SP/field work to incorporate new SAR finding(s) if block still economically viable
  • BA staff should review Site Plan to ensure SAR has been considered and management options are suitable for species habitat needs.
  • Review SAR management options detailed in SP to ensure consistency with previous BA commitments
  • Review any submissions by qualified professional(s) to ensure that they have been properly incorporated into the Site Plan and block/road engineering
  • Seek corrections if inconsistencies or errors/omissions discovered
  • Confirm documentation is present, if required, in relation to SAR and associated reports and recommendations.
	Practices Forester
	Multiphase Forester

• Update SAR tracking form and attach to SAR Block Activity in Cengea Resources with other relevant documents and comments	*Practices Forester* *Multiphase Forester*

• Annual, detailed BA risk-based review of Site Plan population
  • Focus on any high risk EMS/SAR areas that may have been previously identified by BA Planning section
  • Confirm documentation is present, if required, in relation to SAR and associated reports and recommendations.
	Practices Forester
	Operations Technician

PROCEDURE	RESPONSIBILITY
Stage 5: TSL/Contract Package Preparation	

• During preparation of TSL package, review CDC website and UBC Herbarium map layer in Resources to determine if any new SAR occurrences have been mapped in proposed area of activity
  • If new SAR found determine management requirements with QP input as deemed necessary
  • Refine SP, etc to incorporate new SAR finding(s) if block still economically viable
	Operations Technician
	Multiphase Forester

• Update SAR tracking form and attach to SAR Block Activity in Cengea Resources with other relevant documents and comments	*Operations Technician* *Multiphase Forester*
• Review any SAR specific details that must be addressed in TSL or contract documents to ensure they are adequately incorporated into plan	*Operations Technician* *Multiphase Forester*
Stage 6: TSL/Contract Pre-work	
• Review any SAR specific details in Site Plan with Licensee including discussions around how SAR management options were integrated into the block/road engineering and related Site Plans	*Forest Technician* *Operations Technician*

• Provide summary of species characteristics to TSL Licensee to enable additional identification of new occurrences in the field
  ○ SAR name; Latin, common
  ○ Pictures
  ○ Reports
	Forest Technician

Stage 7: Conformance Quality Assurance (Inspection)	
• Review relevant plans and SAR descriptions/information to familiarize self with potential species	*Forest Technician*
• Review relevant plans to ensure thorough understanding of how SAR species habitat needs were to be addressed in the field.	*Forest Technician*
• Check operations to ensure consistency with legal plans.	*Forest Technician*
• Where deviations from the plan have occurred that impact SAR follow standard conformance process. ○ Ensure appropriate agencies have been notified.	*Forest Technician*
• Ensure non-conformances and/or potential non-compliances have been entered into the EMS Issue Tracking System and Action Plan has been developed.	*Forest Technician*
• Return to field for follow-up inspection(s) to ensure any Action Plans/mitigation strategies have been implemented	*Forest Technician*

Wet Weather Safety Shutdown Guidelines (WWSSG) (Rainfall &Snowmelt)

CHINOOK BUSINESS AREA

Important : These shutdown guidelines **are focused on safety;** but may also contribute, in part, to maintaining water quality as these guidelines can reduce the likelihood of worker caused landslide initiation during operations. In most cases operations may have ceased prior to reaching these shutdown guideline limits due to the requirements of other operational controls.

The primary control mechanism to protect water quality is through the operational controls of the EMS. The EMS plays a significant role in water quality as it requires the licensees and contractors to manage erosion and sediment delivery into water bodies appropriately and as required; if the operational controls cannot adequately maintain water quality, operations would be required to cease.

The Chinook BA has been divided into 3 broad precipitation zones each with its maximum water inputs (operational limits) for fixed time periods; "Shift end", 24, 48, and 72 hours. The Chinook BA Staff will indicate which zone you are operating in and the applicable shutdown limits.

The licensee or contractor may use their operational procedures in conjunction with the Chinook BA precipitation zone maps which sets the operational limits for the zone they are working in. If the licensee or contractor does not have their own WWSSG they may consider using the guidelines developed for the Chinook BA. The Business Area Staff representative can review the Chinook BA guidelines with the licensee or contractor at their request.

Excavation Caveat

WorksafeBC Section 20.78 (Excavations) requires written instructions by a qualified professional that specifies the influence of changing weather conditions on the stability of the excavation. This procedure does not waive or take precedence over the requirements of WorksafeBC Section 20.78

A. Environmental signs that require immediate work shutdown and evacuation of the work site

A. Shutdown when these conditions exist.
   a. Sudden muddy water in creek (especially in gullies)
   b. Sudden lack of flow in streams during wet weather
   c. Cracks appearing in the soil
   d. Small (anything ≥1m x 1m) sloughs of soil occurring
   e. Anchor stumps pulling out in wet soil
   f. Landslides occurring in the general area, or sounds of landslides occurring
   g. Sloughs in road cuts, especially during road construction or deactivation.

B. **Operational Conditions where Wet Weather Shutdown Guidelines Should Be Utilized**
   a. Worksite on or below landslide–prone terrain
      i. Definition of "landslide-prone terrain": Areas mapped **U** or **P** on reconnaissance terrain mapping, or mapped Class **V**, Class **IV**, or Class **III** on detailed terrain mapping, or, if no terrain mapping available, any area with slopes **>60%** (**>50%** in Haida Gwaii District), or areas that show signs of instability, or any areas that are defined as having a high or moderate failure potential in Tables A1 or A2 of the Gully Assessment Procedure Guidebook (GAP).

ii. Definition of areas "below landslide-prone terrain": Areas with smooth open slopes or flat ground (no gullies, incised streams, or draws) are considered to be below landslide-prone terrain unless there is **>300 m** of terrain with a slope gradient **<30%** between the landslide prone terrain and the work site or travel route. Any confined area in a gully, or incised stream or draw area, or alluvial fan below a gully, is below landslide prone terrain if there is any upslope landslide prone terrain.

b. Use the "Unstable upslope road conditions" operational limits in Table 1 if there is a road(s) upslope of worksite that is on, or above, landslide-prone terrain and the road(s) has any of the following conditions.
   i. Uncontrolled drainage
   ii. Blocked culverts
   iii. Tension cracks
   iv. Other signs of instability

c. **Note:** Under sunny conditions resulting in snow melt if there is snow on or upslope of work site and road networks exist upslope that have not been assessed for factors listed in Sec. B subsection b. above, do not work unless measurements of snowmelt, and subsequent conversion to water equivalents (mm), are taken and compared to Table C below.

C. Chinook Precipitation Zones: *Operational Limits*

Table #1: Operational Limits for this worksite are shaded in gray:

(Ops Tech to highlight the appropriate precipitation zone and operational limits for the specific worksite i.e. licence or contract)

Zone	Shift end	24 hour	48 hour	72 hour
Very Wet Zone	50mm	100mm	150mm	200mm
Wet Zone	45mm	80mm	130mm	170mm
Drier Zone	30mm	50mm	80mm	110mm
Unstable upslope road conditions	10mm	20mm	30mm	40mm

D. Recommencement of Operations

If any of the water input operational limits for the work site are exceeded via addition of precipitation as measured in a rain gauge added to input levels from snowmelt for tables #2 and/or #3 or #4 (where applicable) then shut down operations as soon as possible

Shutdown for a minimum of one day, and stay shutdown if water inputs continue to exceed any of the operational limits. Maintaining a base station for measuring rainfall and snow melt, and using weather forecasts will help avoid travelling to the work site during shutdown conditions. Restart operations when all of the water inputs are below the operations limits

Wet Weather Safety Shutdown Guidelines (WWSSG) (Rainfall &Snowmelt)

CHINOOK BUSINESS AREA

Snow Melt Soil Moisture Input

Snow melt is an important factor in determining the total soil moisture input. The following tables provide guidance as to the amount of snow melt **that must be added** to the precipitation recorded in a rain gauge at the worksite in applicable situations. Snow melt must be considered at or above the worksite; i.e., where the melt event is occurring.

Table #2: 24 Hour Snowmelt additions during rain-on-snow events

Average Temperature[1]	Open Area			Forested Area		
	WIND[2]			WIND[2]		
	Low	***Moderate***	***High***	***Low***	***Moderate***	***High***
0.5-2.0˚C	3mm	10mm	25mm	1mm	5mm	11mm
2.1 – 5.0˚C	15mm	35mm	75mm	5mm	10mm	25mm
5.1-10.0˚C	25mm	70mm	120mm	10mm	28mm	40mm
10.1-15˚C	35mm	95mm	160mm	15mm	40mm	60mm

Table #3: Hourly snow melt during rain-on-snow events[3]

Average Temperature[1]	Open Area			Forested Area		
	WIND[2]			WIND[2]		
	Low	***Moderate***	***High***	***Low***	***Moderate***	***High***
0.5-2.0˚C	0.15mm	0.45mm	1.05mm	0.04mm	0.2mm	0.5mm
2.1 – 5.0˚C	0.65mm	1.5mm	3.15mm	0.2mm	0.4mm	1.2mm
5.1-10.0˚C	1.05mm	3.0mm	5.0mm	0.4mm	1.2mm	1.7mm
10.1-15˚C	1.5mm	4.0mm	6.7mm	0.65mm	1.7mm	2.50mm

Table #4: Snow melt during sunny conditions

Average Temperature[1]	24 hr Melt		Hourly Melt[3]	
	Open	**Forested**	**Open**	**Forested**
0.5-2.0˚C	8mm	2mm	0.3mm	0.1mm
2.1 – 5.0˚C	24mm	4mm	1.0mm	0.17mm
5.1-10.0˚C	43mm	17mm	1.8mm	0.7mm
10.1-15˚C	53mm	21mm	2.2mm	0.9mm
>15˚C	65mm	25mm	2.7mm	1.1mm

[1] **Average Temperature** is calculated by adding the maximum and minimum temperature for the time period and dividing by 2.
OPTIONAL: Temperature decreases at ***0.5^{0}C*** for every *100m* increase in elevation for **rain-on-snow** and ***1.0^{o}C*** for **sunny conditions**.

[2] ***Low*** (<10 km/hr): Leaves and small twigs in constant motion speed; wind extends light flag
Moderate (10-20km/hr, gusts >30km/hr)**:** Small trees sway, maps/paper difficult to hold still.
High (>20km/hr, gusts >40km/hr)**:** Whole trees in motion, clouds moving rapidly, rain blowing sideways.

[3] Using hourly melt rates to calculate 24 hr melt rates will not equal values in Table 2 and Table 4 because numbers were rounded for ease of calculation.

IF WIND SPEED INDICATORS OVER UNSTABLE TERRAIN CANNOT BE SEEN, ASSUME WIND SPEED IS *HIGH*. WINDSPEED *ALWAYS* INCREASES WITH ELEVATION (MOUNTAIN TOP WINDS ARE HIGHER THAN VALLEY BOTTOM). IT IS RECOMMENDED THAT IF UNCERTAIN ABOUT ANY PARAMETER USE THE MOST CONSERVATIVE VALUES TO ENSURE WORKER SAFETY

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Wet Weather Safety Shutdown Guidelines (WWSSG) (Rainfall &Snowmelt)

CHINOOK BUSINESS AREA

Sample WWSSG Data Sheet

Location:_____ Precipitation Zone:_____

Water Input Operational Limits:

Shift end:_____ 24-hr_____ 48-hr_____ 72-hr:_____

A	B	C	D		E			F	G	H	I	J	K
					Temperature (^{o}C)								
Date	Time	Rainfall (mm)	Open or Forest ? (**O** or **F**)	Wind Speed Class (**L, M, H**)	Min	Max	Ave	Snow melt in (mm)	Water Input mm (Col C+D)	Shift end (mm)	24 hr total (mm)	48 hr (mm)	72 hr (mm)

July 05, 2010