Taan FOREST
From the land and spirit of the Haida.

Taan Forest Ltd & LP

Forest Stewardship Plan Supporting Information

2023 to 2028

Table of Contents

1.0 Preamble

This supporting information document accompanies Taan Forest Ltd & LP ("Taan") Forest Stewardship Plan ("FSP"). This FSP Supporting Information document is meant to assist reviewers in the FSP approval process. Where necessary, rationales have been provided for results and strategies within the FSP that may require added clarification and background information for FSP reviewers to better understand the intent and direction proposed by Taan.

2.0 Application

Protected Area Impacts

In general, it is understood that Taan operations must factor in adjacent landholders and that operations within Taan's tenures should not adversely affect areas outside of the Forest Development Unit (FDU), including Parks or Protected Areas. As such, Taan will plan their operations to factor in adjacent landholders and the values that may potentially be affected. Any management strategies or actions implemented to protect adjacent landholders will be confined to the FDU (i.e., treatments will not occur outside of the FSP Area).

Where Taan operates near other stakeholders or landholders, the standard approach taken will be to contact the stakeholder/landholder early in the development process and work proactively to ensure that stakeholder/landholder concerns are considered.

Legal Surveys

Where Taan proposes development areas near a Protected Area or other property/ tenure boundary, it is incumbent on Taan to ensure that they are not operating outside of the FDU and do not encroach on Protected Areas or other tenures. This is a requirement established under the Forest Act and is not an objective to be addressed under the FSP. When Taan commences development adjacent to a Protected Area or other property/tenure boundary, the first issue they will address is the location of the tenure boundary, utilizing original boundary descriptions and locating blazes and pins in the field. Newer boundaries such as those along Protected Areas and Cedar Stewardship Areas (CSA) will use commercial-grade GPS equipment. In addition to spatially locating boundaries, Taan will typically contact potentially affected stakeholders and work collaboratively to ensure that their management concerns are addressed (e.g., offer to meet with adjacent tenure holders to field check boundary locations).

3.0 Results & Strategies

Clarification

"Operational Feasibility" is added to sections of the FSP including culturally modified trees (CMT) and monumental cedar management. This was added as a consideration for planners and the Integrated Stewardship Team during an intergovernmental process required when modifying a CMT or monumental reserve or removing a monumental cedar or CMT. It was specifically added for situations where a strategy within the HGLUOO could be used to modify the reserve or remove the CMT or monumental, but the environmental impact, cultural loss and/ or feasibility of implementing the

strategy is unnecessary.

An example is a CMT or monumental located near the end of a road. The reserve and management zone will make logging the area behind the reserve impossible, or impracticable (high costs, high site impact from machinery etc.). The CMT or Monumental could be removed utilizing the HGLUOO strategy that it could be removed for "a road". Planning could push the road forward and the tree would be removed. However extra costs and more site impact is a result from adding unnecessary road, only to remove the CMT or monumental within HGLUOO objectives. A consideration of "Operational Feasibility" to remove the tree without unnecessarily building more road, would allow for access to the area.

Cultural Objectives

Taan utilizes Certified Cultural Feature Identification surveyors to identify and inventory Haida Cultural Features. These surveyors are certified by the Council of the Haida Nation for the identification of Haida Cultural Heritage and Forest Features including but not limited to: CMTs; monumental cedar; cultural plants Yew and crab apple trees.

The Cultural Features Identification Survey (CFIS) program includes a quality assurance/audit to ensure that the surveys meet the standards of the CHN. The frequency and timing of the audits is dependent of the CHN.

The survey can take between one year and three years to compete depending on the complexity of the block, re-surveying, change in layout, plant germination and access to the development area. At any one-time surveyors working for Taan can have up to 40 CFI surveys underway, all under different development stages.

CFI surveyors are requested to identify CMTs, Class I & II Heritage Features, Monumentals and Class I Forest Features initially to inform Taan if there is harvest opportunity or not. With harvest opportunity engineering and layout commences and the CFI survey continues to identify other Cultural Heritage and Forest Features in the development area.

When complete the survey includes a write up, description of the area surveyed, preferred as a map of "Tracks" of the surveyor, a map of the survey area and identified features and submission of a geodata base of inventory of features collected. All feature inventory belongs to the CHN and is utilized by Taan to ensure features are managed appropriately and in accordance with the FSP and HGLUOO

The surveys are independent of Taan Forest but a primary assessment required to develop a harvest area. Taan Forest does not direct or interfere with the surveys, only direct surveyors to potential development areas to identify the Cultural and Heritage features so they can be properly managed in accordance with the FSP and HGLUOO by Taan. Taan does assist with the written reports for some surveyors. The survey is quite technical, requires a very high pass rate if being audited, and the write up requires technical writing skills. In many situations surveyors have grade 12 education with no formal technical writing, statistical training, or formal forestry education. In recent years, because of the complexity of the survey, Taan has found with communication from the CHN that certified surveyors are missing features. Taan does have "Chance find" procedures when harvesting commences, however the features being missed are found through auditing and are enough to halt planning and in many cases require re-surveying of development areas delaying or eliminating potential harvesting opportunities.

The survey methodology is developed by the CHN, requiring the signature of the certified surveyor to ensure completeness of the survey and report. It is Taan's opinion that the survey, in its current format, is a fine line between identifying cultural features and the Practice of Professional Forestry. Taan is

developing procedures to ensure that all CFI surveys completed on Taan Tenures are overseen and co-signed by a Registered Professional Forest or Registered Forest Technician to ensure completeness of the survey and report. It is Taan's intent by providing professional accountability with the surveys there will be fewer missed features, and proper write-ups.

Ledger – Taan utilizes a spatially based tracking ledgers to track harvesting area, hydrological recovery area, total area of upland stream area, % hydrological recovery, % hydrological recovery balance, sensitive watershed available area to harvest, MAMU habitat by landscape unit, and Ecological Representation by Landscape Unit. The most recent example at the time of submission of this FSP can be found in the Appendix.

Haida Traditional Heritage Features

Applicable HTHFs

The Council of the Haida Nation's Cultural Features Identification Survey dictates that when potential HTHFs are identified during a survey, an independent Archaeological Impact Assessment (AIA) must be conducted. Where AIAs are completed, it is standard practice for the archaeological report to indicate the cultural significance of any features that are identified. Therefore, the AIA will be considered the source for determining the significance of the identified feature and whether it is ultimately considered an HTHF (Schedule 2 of the LUO includes a list of features determined to be of cultural significance to the Haida Nation).

Karst

"Karst Features" are identified in the LUO as Class 2 HTHFs and have results specific to the LUO Objectives for HTHFs. Under the LUO, Karst Features are not well defined and would therefore include all potential karst occurrences.

"Karst Resource Features" have also been established under GAR, which includes a more specific definition. Additional results have been specified for the FRPA requirements.

If a karst occurrence meets the definition of Karst Resource Feature as designated under the GAR Order, it will be managed to the higher standard, which will ensure that it is not damaged or rendered ineffective.

If an unidentified karst features or values (e.g., cave entrance, sinkhole, sinking stream, unique or unusual karst flora/fauna) are encountered during harvesting, activities should be modified or ceased until the features or values are properly assessed, and measures are in place to protect or manage the feature or value. Newly discovered locations of features/values in the field are to be forwarded to the local Ministry of Forest district office.

Haida Traditional Forest Features

Class 1 HTFFs

Tree length measurement method will be based on the development area and not individual features. For example, there will not be a mix of measurement methods in a development area. If ecosystems area used, ecosystems are used for the entire development area. The heights of the tree will be dependent on the ecosystems that each feature is in.

If the tallest tree is used, the tallest tree will be used for the entire development area. The tallest mature or Old Growth Tree adjacent each feature will be used to determine tree height. A reserve zone of 1 tree-length will be applied to this feature, as well as a 1 tree-length management zone to aid in the protection and preservation of this feature.

Class 2 HTFFs

To be consistent with the LUO, the establishment of stand level retention will be one of the strategies employed to maintain the integrity of the HTFF. The use of stand level retention will be at the discretion of the signing Forester and will be detailed in the Site Plan. At a minimum, stand level retention will include the retaining of shade and non-merchantable trees adjacent to the feature to act as a buffer from logging damage, the prescription of a machine-free zone from harvesting, the falling of larger trees of economic value or that may endanger the Class II Forest feature, provided the Class II Forest Feature is still protected.

Cedar Retention

15% Cedar Retention Requirements

Taan has implemented strategies in the FSP to meet the objective. During development of the block, if it is obvious to the supervising engineer that the block composition exceeds 6.20 a) or b) then a minimum 15% will be retained of a similar cedar composition. If it is not obvious to the supervising engineer, the weighted cedar retention requirements will be calculated using the inventory mapping information available. An example to illustrate such calculations is provided in Figure 1 below.

Figure 1: 15% cedar retention calculation example.

Sample Development Area

Development Area = 35.0ha, consisting of 3 inventory polygons

Polygon A= 15.0ha - Inventory= C_{10}

Polygon B = 10.0ha - Inventory= H_5B_5

Polygon C = 10.0ha - Inventory = H_5C_5

No-harvest zones established for Type I Fish Habitat= 3.5ha (Inventory = C_{10}) Monumental Cedar No-harvest zone= 2.5ha (Inventory = H_5C_5)

Weighted Cedar Content Calculation

The weighted pre-harvest cedar composition for the Development Area is calculated as follows:

Cedar % = (sum areas of inventory polygons * associated % cedar content)/area of Development Area

= [(Polygon A* Cw inv. for A) + (Polygon B * Cw inv. for B) + (Polygon C * Cw inv. for C)]/ area of Development Area

= [(15.0ha*100%) + (10.0ha*0%) + (10.0ha*50%)]/35.0ha

= [(15.0 + 0 + 5.0ha)]/35.0ha

= 20.0ha/35.0ha

= 57% = pre-harvest combined cedar content for the Development Area (or 20.0ha, measured in area)

Therefore, as the Development Area is > 10.0ha and the combined pre-harvest cedar content is> 30%, the 15% cedar retention requirement applies.

Calculation of Cedar Area Required

In order to meet the cedar retention requirement, Plan Holder must retain a minimum of 15% cedar, measured in hectares, consistent with the FSP Strategies. For the example above, the minimum cedar retention area required would be calculated as follows:

The minimum Cedar Retention Area required = 15% * the weighted cedar content for the Development Area. As calculated above, the weighted cedar content was 57%, or 20.0ha

= 15%*20.0ha

= 3.0ha

Therefore, for the Development Area, 3.0ha of cedar area must be reserved (i.e., 3.0ha of C_{10} inventory; or 6.0ha of H_5C_5).

Establishing Cedar Reserves

In this example, there are two retention areas already established. The sum of the weighted cedar retention areas associated with the established retention areas is calculated as follows:

Cedar content for Type I Fish Habitat no-harvest zone = (area* cedar inventory for polygon)

= 3.5ha*100%

= 3.5ha

Cedar content for Monumental Cedar no-harvest zone = (area* cedar inventory for polygon)

= 2.5ha*50%

=1.25ha

Therefore, the total weighted area of existing cedar retention areas = 3.5 + 1.25ha = 4.75ha

Summary

Given that there are > 3.0ha of cedar retention areas established for the Development Area and that both of the designated cedar retention areas are greater than 1.0ha in size, for this example, provided that the prescribing Forester confirms that the cedar retention stands contain a range of diameters of cedar that are representative of the pre-harvest stand, all of the strategies for the 15% cedar retention requirement are deemed to be met.

With regards to the strategy for retaining a range of cedar representative of the pre-harvest area, Taan will do this by selecting areas of similar species and stand characteristics as the harvest area. Where the prescribing Forester cannot easily determine that 15% weighted cedar is retained, the weighted cedar area retained will be calculated as above to ensure the objective is met. It will be left to the prescribing Forester to ensure that the cedar retention stands selected to meet the 15% requirement are

representative of the pre-harvest stands, and this should be documented within the Site Plan.

20% Cedar Regeneration Requirements

Taan will calculate this strategy by defining "composition" based on live stems per hectare of Red and Yellow Cedar (as indicated in the cruise compilation), rather than using a volumetric approach (use of sph is consistent with previous MSSc procedures).

Specific rationales for cedar retention objective are provided (in FSP section) as follows:

Where development areas have pre-harvest cedar (western redcedar and yellow cedar) composition greater than 20% in the harvested area, as indicated in the cruise compilation (measured in percent of cedar sph, not including dead potential or dead useless), then the Plan Holder will regenerate the area according to the minimum post-harvest cedar composition and strategies listed below.

In regard to the use of stem per hectare (sph) versus volume (m^3) or basal area (m^2), it was thought that sph would provide the most accurate picture of the timber composition on site; using volume or basal area may have resulted in varying percentages for similar blocks. With regards to the removal of dead potential and dead useless from the cruise information (i.e., net-merch volume), it was determined that they should not be included in the calculation as they are no longer contributing to the Mean Annual Increment of the site. This portion of the LUO objective is focused on cedar regeneration—replacing live trees with live trees. Using the net-merch volume is the most logical and consistent approach for achieving this objective.

The cedar commitment will be determined on a cutblock-by-cutblock basis. The cedar regeneration requirement for a cutblock will be calculated by multiplying the NAR times the appropriate Minimum Post-Harvest Cedar Composition, as indicated in Table 1 below. Location of planted cedar within the cutblock will be at the discretion of the prescribing Forester, and consistent with approved stocking standards.

Table 1: Minimum Post-Harvest Cedar Composition, Based on Pre-Harvest Cedar Composition.

Pre-Harvest Cedar Composition %	Minimum Post-Harvest Cedar Composition (sph)
20 – 29	100
30 – 39	150
40 – 49	175
50 – 59	200
60 – 69	250
70 – 79	300
80 – 89	350
90 – 100	400

The Net Area to be Reforested (NAR) is used as this is the only area that will be restocked. All reserves and NPUNN will not be restocked. Table 1 was established based on the former Cedar Policy for the Haida Gwaii Forest District, with increases to the policy standards for the top two pre-harvest composition categories.

The location for planting the required cedar has been left up to the prescribing Forester, so that they can maximize site productivity by planting the cedar in the most desirable locations.

The use of naturals will be encouraged and will count towards the final survey of cedar.

Taan is committed to protecting planted trees as well as monitoring them for survival. The 80% survival target was established as a reasonable benchmark to initiate fill planting. By allowing up to 20% mortality of planted cedar, Taan is afforded a reasonable amount of operational flexibility. The 20% leeway in survival will also temper any variation or anomalies that come about during surveys.

Cedar acceptability criteria will be as follows:

a. *Regenerated cedar will only be accepted if they are of good form and vigour*
b. *Regenerated cedar will only be accepted if they are ≥ 1.2m tall.*

Acceptability criteria are provided to support the fact that Taan is working to establish cedar regeneration so that the replanted trees will be reasonably expected to form part of the future stand. While the cedar obligation is not part of a Free-Growing Survey, the acceptability criteria are much the same. Acceptability criteria are based on the Free Growing tree damage criteria as defined in the Ministry of Forests' Establishment to Free Growing Guidebook for the Vancouver Forest Region-V2.3.

The 1.2m minimum height is provided to ensure that the cedar regeneration is above deer browse height and beyond the need for protection.

While the cedar obligation resembles a free-growing survey in some respects, it is a different, stand-alone obligation, and will be managed accordingly. The obligation due date has been established so that Taan is encouraged to meet the cedar regen obligation as early as possible, but still has enough time to allow for fill planting and stand tending activities, if required.

It should be noted that while there will be a minimum post-harvest cedar composition calculated for the block, the final amount of cedar established may not always meet the requirement. Provided that Taan has shown due diligence in attempting to re-establish a cedar composition (i.e., planted, protected, surveyed, fill planted once) then the obligation will be deemed fulfilled based on the amount of cedar that have been established.

The cedar regeneration requirement for a given cutblock may be lower than those set in FSP, provided that the new requirement is consistent with the outcome of a completed intergovernmental process.

For areas that have been planted with red and/ or yellow cedar, where the combined cedar content falls below 80% of the Minimum Post-Harvest Cedar Composition requirement, the area will be fill-planted once. Additional fill planting may be required provided that:

a. The fill planting is required because of a catastrophic failure such as fire, insect damage or stock health and/ or,

b. The survey by a Taan Forester and or his/her representative indicates that any newly planted cedar will survive and be part of the Free Growing Stand.

An intergovernmental process option was added to the Cedar Regeneration Section to allow the Plan Holder the option of addressing exceptional circumstances, for example other objectives established under the LUO.

<u>Improving Cedar Regeneration</u>

Taan ensures that post-harvest Cedar Composition is met by planting more than the minimum required Cedar and in second growth white wood stands, where cedar stumps from the first harvest are evident, Taan plants cedar to convert the stand back to cedar, even though not required. Taan conducts routine required and non-required surveys of plantations to ensure that they are performing in accordance the obligation and expectations. Taan adheres to reasonable procedures to ensure that plantation achieve free to go but accelerating the growth of cedar on Haida Gwaii has been particularly difficult because of deer browse. Taan has focused on the individual tree fertilization of cedar at time of protector removal to ensure trees are successful in being dominant or co-dominant in a new forest. Hand fertilization of individual stems can give the tree the boost it needs to meet free to grow standards. This has also increased carbon sequestration and the success of future old-growth forests.

Western Yew

Taan's objective is to protect as many as Western Yew trees as possible. The Licensee wishes to target protection of 100% of individual Western Yew on a development area level. This target can be tracked by comparing the pre-harvest and post-harvest mapping and recording of Western Yew occurrences.

Taan will complete the following to protect Western Yew trees in development areas:

a. Target 100% retention of all yew trees in a development area,

b. Fall and yard away from yew trees,

c. Retain non-merchantable wind-firm timber around yew trees,

d. In cable areas, set cable corridors to minimize impact to yew trees,

e. If yew trees must be cut down for safety purposes, leave a high stump and as many branches as possible,

f. During engineering of development area, retain as many yew as possible within reserves and retention

areas,

g. During engineering, set up yew management areas where larger non-yew trees will be tipped out the area with little or no machine impact in the management area,

h. Strive to use and develop alternate silviculture and harvest systems that will minimize impact to yew trees where there are high concentrations of these trees.

i. Individual stems inside the harvest area will be placed in stand level retention where possible or retained on their own with site-specific instructions to not damage or destroy the Western Yew.

Increasing Wood Utilization

Taan has increased local wood buying opportunities through the utilization of residual uneconomic and marginal fibre that would otherwise be burned. This residual fibre is currently uneconomical due to the high costs of logging and transportation associated with low-value lumber. These low-grade logs have now been made available at market prices to coastal pulp mills and local buyers. These sales will be implemented on Taan's licenses to support increased utilization and decreased emissions, Provincial climate change objectives, and create employment within Haida Gwaii and beyond.

Monumental Cedars

Monumentals in accordance with the HGLUOO background and intent document are large cedar trees that are rare on the landscape. Monumental cedars are identified through the CFI process mentioned above. Inventory of the monumentals is provided to the CHN for the cultural wood access program. At the time of this FSP, Taan has identified over 1200 monumentals, each protected with a reserve and management zone. The CHN is to maintain the monumental inventory to allow access for Haida Citizens to cultural wood specifically for long house beams, canoes or totems.

In accordance with this FSP and the HGLUOO some monumentals can be harvested during Taan's harvest operations. When a monumental is harvested by Taan, Taan will do the following to track the harvesting of Monumental Cedars and provide them to the Haida Nation (refer to Taan's Monumental Cedar SOP in Appendix):

a. Monumental cedars will be identified during the block planning stage for harvesting by certified CFI surveyors,

b. Members of the CHN are informed that monumentals will be harvested and to expect their arrival for the Cultural Wood Access program

c. Monumental Tracking forms are to be completed by harvesting and Taan supervisor upon commencement of harvesting,

d. It is then the responsibility of the harvesting supervisor to ensure that each monumental is accounted for through the subsequent phases of yarding, hauling, and arriving to the sort.

e. Completed forms are to be forwarded to a Taan representative within 3 business days of the monumental being hauled to the sort.

Aquatic Habitats (LUO) & Riparian Areas (FRPA)

Stream Riparian Classifications and Management – LUO vs. FRPA

There is significant "overlap" between the requirements under the LUO and FRPA (including the FPPR). For most objectives, reconciling the differences between the two is straightforward. However, there is significant conflict between the LUO and FRPA regarding stream classification, and to a lesser extent, stream-management requirements.

The LUO and FRPA both establish stream classification systems, which do not correlate 100% of the time. Both also establish reserve and management zones, which again, do not correlate exactly (FRPA zones are measured in meters and LUO zones are measured in tree-lengths, which are linked to site series and seral stage). Lastly, the LUO and FRPA both establish restrictions and management requirements within riparian areas, but again, these do not necessarily correlate.

FRPA classify streams as follows:

A stream that is a fish stream or is located in a community watershed has the following riparian class:

a. S1A, if the stream averages, over a one km length, either a stream width or an active flood plain width of 100 m or greater,
b. S1B, if the stream width is greater than 20 m but the stream does not have a riparian class of S1A,
c. S2, if the stream width is not less than 5 m but not more than 20 m,
d. S3, if the stream width is not less than 1.5 m but is less than 5 m,
e. S4, if the stream width is less than 1.5 m.

A stream that is not a fish stream and is located outside of a community watershed has the following riparian class:

a. S5, if the stream width is greater than 3 m,
b. S6, if the stream width is 3 m or less.

Table 2, below, provides a brief comparison of the riparian requirements between the LUO and FRPA. For analysis purposes, the tree-length height for LUO streams was assumed to be 40m, based on an average tree-height for zonal sites across all BEC units and seral stages. If anything, this assumption is conservative, as most riparian areas are likely richer than zonal sites, resulting in taller tree-heights.

Table 2 shows that in most cases, the riparian reserve requirements meet or exceed those established under FRPA, especially for Type I and II Fish Habitat streams.

Table 2: LUO vs. FRPA Stream Management Comparison.

	Stream Class	RRZ / No-Harvest Zone	RMZ	RMA	RMZ BA Retention
Comparable large fish stream classes and management zones (LUO) vs. FRPA)	FRPA - S1	50m	20m	70m	0 – 100
	FRPA - S2	30m	20m	50m	0 – 100
	FRPA - S3	20m	20m	40m	0 – 100
	LUO - Type I Fish Habitat	2.0 tree-lengths (80m)	-	2.0 tree- length (80m)	N/A
Comparable small fish stream classes and management zones (LUO) vs. FRPA)	FRPA - S4	-	30m	30m	0 – 100
	LUO - Type I Fish Habitat	2.0 tree-lengths (80m)	-	2.0 tree- lengths (80m)	~100%

Comparable "non- fish" stream classes and management zones (LUO) vs. FRPA)	FRPA - S5	-	30m	30m	0 – 100
	FRPA - S6	-	20m	20m	0 – 100
	LUO - Upland Stream	-	-	30m	N/A

Two realistic options exist when trying to develop results/ strategies to address both the LUO and the FRPA objectives: follow the LUO only or try to develop a process to simultaneously meet the conflicting objectives of both the LUO and FRPA.

The FSP has been developed to address all the stream riparian requirements using the LUO approach, except for where a LUO approach does not address a stream, as is the case for S5 and S6 streams. These examples will be managed as per FRPA (and FPPR) requirements.

Recently, Taan has begun implementing the Land Management Handbook #68 (LMH68) into site classification decisions for all FDU's. At a site plan level, this will change site series delineation and have an impact on management buffers based on tree heights and stocking standards for planting in adjacent cutblocks. The stocking standards table, XXX, has been updated to reflect the changes of using the LMH68.

Wetlands & Lakes

The FSP was developed for when wetlands and lakes meet the definition of Type I or II Fish Habitat, which will be managed as such. However, in all other cases, wetlands and lakes will be managed as per FRPA (and FPPR) requirements.

FRPA classify wetlands as follows:

Wetlands have the following riparian classes:

a. W1, if the wetland is greater than 5 ha in size.

b. W2, if the wetland is not less than 1 ha and not more than 5 ha in size and is in one of the following biogeoclimatic zones or subzones:

   i. Ponderosa Pine.

   ii. Bunch Grass.

   iii. Interior Douglas-fir, very dry hot, very dry warm or very dry mild.

   iv. Coastal Douglas-fir.

   v. Coastal Western Hemlock, very dry maritime, dry maritime or dry submaritime.

c. W3, if the wetland is not less than 1 ha and not more than 5 ha in size and is in a biogeoclimatic zone or subzone other than one referred to in paragraph (b).

d. W4, if the wetland is

   i. not less than 0.25 ha and less than 1 ha in size and is in a biogeoclimatic zone or subzone referred to in paragraph (b) (i), (ii) or (iii), or

   ii. not less than 0.5 ha and less than 1 ha in size and is in a biogeoclimatic zone or subzone referred to in paragraph (b) (iv) or (v).

Despite subsection (1), an area is to be treated as a single wetland with a riparian class of W5 if

a. the area contains
    i. two or more W1 wetlands located within 100 m of each other,
    ii. a W1 wetland and one or more non-W1 wetlands, all of which are within 80 m of each other, or
    iii. two or more non-W1 wetlands located within 60 m of each other, and
b. the combined size of the wetlands, excluding the upland areas, is 5 ha or larger.

FRPA defines Lakes as follows:

Lakes have the following riparian classes:

a. L1-A, if the lake is 1 000 ha or greater in size.
b. L1-B, if
    i. the lake is greater than 5 ha but less than 1 000 ha in size, or
    ii. the minister designates the lake as L1-B;
c. L2, if the lake is not less than 1 ha and not more than 5 ha in size and is located in a biogeoclimatic zones or subzone that is
    i. Ponderosa Pine,
    ii. Bunch Grass,
    iii. Interior Douglas-fir, very dry hot, very dry warm or very dry mild,
    iv. Coastal Douglas-fir, or
    v. Coastal Western Hemlock, very dry maritime, dry maritime or dry submaritime.
d. L3, if the lake is not less than 1 ha and not more than 5 ha in size and is in a biogeoclimatic zone or subzone other than one referred to in paragraph (c),
e. L4, if the lake is

i. not less than 0.25 ha and not more than 1 ha in size and is in a biogeoclimatic zone or subzone referred to in paragraph (c) (i), (ii) or (iii), or

ii. not less than 0.5 ha and not more than 1 ha in size and is in a biogeoclimatic zone or subzone referred to in paragraph (c) (iv) or (v).

Habitat Restoration

Habitat restoration silviculture projects attempt to improve wildlife habitat characteristics of previously harvested over dense conifer stands. Typically, riparian areas are targeted for treatment because of their already existing reserve zones, but as well because of the multiple benefits restoration work can have with stabilizing stream banks as well as improve wildlife habitat. The goal of the *Treatment* is to repair area in a way that mimics old growth attibutes by accelerating the establishment of mature forest characteristics. Thinning, girdling, and managing the woody debris are the main activities completed by

local silviculture crews. Fallen tree slash will provide temporary coarse wood debris and standing dead trees will provide wildlife habitat. Remaining trees will grow faster creating large branching for nesting and large rooting structures to stabilize stream zones. These features will be replenished over time when individual trees die naturally. The results of the treatment will be the acceleration of these forests towards older mature forest characteristics that ultimately resemble more closely old growth land features that were present prior to industrial disturbance.

Upland Stream Areas

Hydrological Recovery

In the Upland Stream section of the FDU, the term "hydrologically recovered" is used when referring to Upland Stream Areas. Hydrological recovery will be determined by applying a consistent methodology utilizing:

a. Most current inventory – includes plan holder's updates from field verifications and inventory investments,
b. The total area of the subunit less Type I and II Fish Habitat area,
c. Hydrological recovery curves appropriate for the area.

Inventory & Tracking Ledger

Prior to initiating developments within one of the designated watershed subunits, Taan will complete an analysis to determine the "baseline inventory" of Upland Stream Area and the proportion that is not hydrologically recovered. The analysis is meant to be a GIS exercise that produces a tabular summary of areas that are hydrologically recovered or not, with a spatial element to illustrate the results. These two outputs will form the basis for the Tracking Ledger.

To ensure all commitments are met, Taan will continue to maintain the Ledger to track the hydrological status of the watershed subunit.

Watershed Assessments

Where the Plan Holder proposes to harvest such that <70% of a watershed subunit is hydrologically recovered, they have committed to ensuring that watershed assessment is completed by a qualified professional. Given that Taan is exceeding the "default" threshold of 70%, a more stringent assessment of the watershed subunit is required. Therefore, the "watershed assessment" is meant to be detailed in nature and will be completed by a qualified professional (e.g., like a Coastal Watershed Assessment Procedure).

High-Humidity Microclimates

The FDU includes a result regarding stream channels in Upland Stream Areas that are incised, have steep gradients, and support riparian plant communities that are dependent on high-humidity microclimates.

Two key factors will be used to determine whether a stream qualifies: it must possess characteristics sufficient to produce the high-humidity microclimate, and the diagnostic high-humidity dependent plant community must be present. These two factors are interdependent, and the Plan Holder must consider both when identifying these unique Upland Stream channels.

As a general guideline for identifying these key pieces, the following is provided:

Riparian Plant Community

a. On creek sidewalls and adjacent trees, plant communities will consist of ferns, herbs, and shrubs that are dependent on moist/ wet soils (e.g., maidenhair fern, lady fern, and salmonberry), as well as an abundance of bryophytes that are dependent on high moisture levels.

Stream Channel Characteristics

b. Streams are typically 1–3m wide, with bedrock substrates and are generally steep (>20% slope) and broken/ irregular with step-pool structure.

c. Channels are typically deeply incised (similar to a gully, sidewalls >3m, side-slope >50%) and rock controlled, with minimal soils, thus leaving minimal potential for erosion or debris flows.

d. Channels typically contain waterfalls, and a spray/ mist is produced or will be during high water flow, creating a cooler microclimate (noticeable on a warm day).

e. Streams are usually shaded by trees or oriented such that shade is produced within the reach, regardless of canopy closure.

Sensitive Watersheds

Inventory & Tracking Ledger

Prior to initiating developments within one of the designated sensitive watersheds, the Plan Holder will complete an analysis to determine the "baseline inventory" for the watershed, including determining the current ECA. The analysis is meant to be a GIS exercise that produces a tabular breakdown of the ECA, with a spatial element to illustrate the results.

ECA will be calculated based on:

a. Most current inventory – includes Plan Holder's updates from field verifications and inventory investments,

b. The total area of the sensitive watershed,

c. Hydrological recovery curves appropriate for the area.

To ensure all commitments are met, the Plan Holder will maintain the Ledger to track the ECA for the watershed.

Watershed Assessments

Where Taan proposes to harvest in a way that exceeds the prescribed ECAs for a sensitive watershed, they commit to ensuring that a watershed assessment is completed by a qualified professional. Given that the Plan Holder is exceeding the "default" ECA, a more stringent assessment is required. This watershed assessment will be detailed in nature and will be completed by a qualified professional (e.g., similar to a Coastal Watershed Assessment Procedure).

Temperature-Sensitive Streams

There are no temperature-sensitive streams designated in the FDU. Should a temperature-sensitive stream be designated, Taan will follow the practice requirements under FPPR s. 53.

Community Watersheds

Watershed Assessment & Tracking Ledger

Prior to initiating developments within one of the designated Community Watersheds, Taan will ensure that a watershed assessment is completed. This assessment will be detailed in nature and will be

completed by a qualified professional (e.g., like a Coastal Watershed Assessment Procedure).

Active Fluvial Units

Refer to the *Glynnis Horel* Alluvial Fluvial Units for Haida Gwaii paper in the Appendix.

Biodiversity

Ecological Representation

Representation Analysis

The representation analysis proposed by Taan is a GIS-oriented exercise to determine the inventory of ecosystems, based on the best information available and updates to the information including but not limited to field verifications and TEM updates.

Tracking Ledger

To meet the LUO Objectives, Taan will maintain a Ledger to track the additions/removals to the baseline ecosystem inventory, including areas that have been designated for recruitment.

Adjacency

Taan recognizes the importance of biodiversity on the landscape. They refer to the Biodiversity Guidebook developed in 1995 along with FRPA and FPPR requirements to determine adjacency and connectivity. Generally, Taan will adhere to a 400m leave strip between harvest areas unless the prescribing Forester provides a rationale to minimize the leave strip.

Northern Goshawk, Great Blue Heron, and Northern Saw-Whet Owl

An objective of Taan is to identify and manage for the habitats of Northern Goshawks, Great Blue Herons, and Northern Saw-Whet Owls. Taan will adhere to the Ministry of Environment Guidelines for Raptor Conservation. Experience, education, and further training of the Taan's forestry development team in nest identification should result in potential nests being identified during the planning phase. If/when the forestry development team identifies a potential nest site, Taan shall have the potential nest and surrounding area assessed by a qualified registered professional working within their scope of practice to determine/confirm if the nest is present and belongs to a Northern Goshawk, Great Blue Heron, or Northern Saw-Whet Owl. The prescribing Forester will consider Northern Goshawk, Great Blue Heron, and Northern Saw-Whet Owl habitat creation when prescribing stand level retention strategies. Retaining snags and larger trees with old-growth characteristics will be prescribed and documented in the Site Plan when the prescribing Forester determines that the cutblock is suitable for such methods.

Marbled Murrelet Nesting Habitat

Inventory

The "inventory" is meant to be a GIS exercise to clarify the Marbled Murrelet nesting habitat that has been identified, and what nesting habitat has been reserved. It is not meant to be a field analysis to identify or refine nesting habitat. The inventory analysis will be based on the best information available (i.e., the "Ecological Representation analysis conducted during Detailed Strategic Planning by the Joint Technical Working Group 2010").

Tracking Ledger

To meet the LUO Objectives, the Plan Holder will maintain a Ledger to track the additions/removals to the baseline Marbled Murrelet nesting habitat inventory.

Northern Goshawk Habitat

Restricted Activities

As restricted activity zones can significantly impact forest operations, especially where nests are close to major roads, the Plan Holder will complete an assessment to determine if the nest is active. Where the assessment determines that the nest site is inactive, the restricted activity zone will not be required. The assessment completed by the qualified professional:

a. will be completed within the Goshawk breeding season, and,

b. will be re-assessed each breeding season, unless the Plan Holder elects to maintain the restricted activity zone, regardless of nest use, and,

c. will consider the various Northern Goshawk nest uses, nest fidelity, and the best information available with regards to Northern Goshawk recovery strategies.

Habitat Enhancement

To help adhere to the Ministry of Environment Guidelines for Raptor Conservation, Taan has worked on creating additional nesting sites and forage area for the Northern Goshawk. Ecologically, the tree species composition that is present on Haida Gwaii adhere to goshawk nesting and forage requirements, but the tree density do not. In many locations trees density is too high and results in poor nesting potential. Taan has implemented silviculture treatments that utilize spacing and thinning to expedite growth and dominance of leading species. These treatments result in increased habitat for goshawks. Spacing and pruning is also expected to enhance wildlife habitat, including goshawk forage habitat by creating open flight paths between trees and introducing light to the understory for brush and berry development for goshawk prey forage.

Great Blue Heron Nesting Habitat

As restricted activity zones can significantly impact forest operations, especially where nests are close to major roads, the Plan Holder will complete an assessment to determine if the nest is active. Where the assessment determines that the nest site is inactive, the restricted activity zone will not be required. The assessment will be completed by the qualified professional within the Great Blue Heron breeding season, and:

a. will be re-assessed each breeding season, unless the Plan Holder elects to maintain the restricted activity zone, regardless of nest use, and

b. will consider the various Great Blue Heron nest uses and the best information available with regards to Great Blue Heron habitat management.

Black Bear Dens

An objective of the Plan Holder is to protect Black Bear dens used for over-winter hibernation. A qualified person, who is defined as a Forestry Professional, or someone working under the direct supervision of a Forestry Professional, who has completed wildlife and bear identification training or has equivalent experience, will complete a Black Bear den reconnaissance of each block during the planning stage. If a Black Bear den is being used (occupied) for over-winter hibernation is located, the Plan Holder will adhere to the results and strategies of this plan. Where possible the Plan Holder will include management zones, areas adjacent to management zones, and potential dens in stand level retention. Stand level retention will be prescribed and documented in the Site Plan, and when the prescribing Forester determines the cutblock suitable for such methods, retention patches will be linked together.

A windthrow assessment will determine the likelihood of wind damage and the prescribing Forester will use this information to prescribe the appropriate stand level retention strategy.

In areas of past harvesting targeted for Habitat Restoration as mentioned above (Riparian Restoration) Taan will identify potential stumps or logs that could be used for overwintering dens. These potential stumps or logs are reconstructed into dens as an interim measure while the surrounding stands develop and new, natural dens are recruited.

Annual Reporting and Data Submission

Throughout the FSP, the Plan Holder committed to submitting documentation and digital spatial data to the Council of the Haida Nation and the Province of BC, on an annual basis. For clarity, a December 31st deadline was chosen, as this is typically an effective time both operationally and administratively. Generally, all development area information is submitted at the RP and CP stages, meeting the annual reporting and data submission objective. The December 31 deadline will still be utilized for any updates to the data or features outside development areas that did not get captured in the RP or CP submission process.

Windthrow Management & Management Prescriptions

It is recognized that windthrow is a significant management issue within the Plan Area. Although objectives are not clearly established in legislation for windthrow management, the Plan Holder has included the following information to illustrate their intent and commitment to managing windthrow in relation to their development activities.

For all cutblock areas, the Plan Holder will complete windthrow assessments. The assessments will be completed to standards as outlined in windthrow assessment training on Haida Gwaii and will include a consideration of both windthrow hazard and consequence criteria, resulting in an overall windthrow risk rating. Additionally, the windthrow assessment:

a. will be signed off by a qualified professional, and,

b. will be used to develop management prescriptions for appropriate areas, particularly management zones or no-harvest zones, based on knowledge of prevailing winds and resource features in the area.

Examples of Windthrow Assessment Field Cards and Summary Forms (Taan Forest) are provided in the Appendix.

As noted above, management prescriptions with regards to windthrow will be based on information from the windthrow assessment. It should also be noted that windthrow assessment methods and associated management prescriptions may be informed by monitoring information and results that are available, including Forest and Range Evaluation Program (FREP) reports and information.

Tracking Ledgers - General

The concept of maintaining a Ledger was developed during the implementation of the 2011 Haida Gwaii FSP to track the requirements associated with Cedar Stewardship Areas, Upland Streams, Sensitive Watersheds, Ecological Representation and Marbled Murrelet nesting habitat,

The purpose of the Ledgers is to provide a clear picture of the baseline/ existing status of the element in question and allow the Plan Holder and Ministry of Forests staff to understand and track the progress of forest operations and planning. The Ledgers form part of the due diligence system, as well as being planning tools for meeting FSP obligations. The Plan Holder will continue to maintain them for their tenure areas.

4.0 Climate Change

The Plan Holder recognizes the significance of climate change and how it may alter their management strategies in the future and is taking steps to prepare and plan for the changing climate.

The plan holder is currently working on a climate change risk assessment through its certification body. The process utilizes provincial and national data as well as local knowledge to identify risk events potentially caused by climate change. Further the risks are analyzed and evaluated to determine what mitigation efforts exists for those risks, are they adequate, identify the gaps and create action items to fill the gaps.

The Plan Holder continues to work with and assisting in funding with researchers from the University of British Columbia's , Research includes:

1) Yellow Cedar dieback research, , with the objective of determining the best management strategies for Yellow Cedar on Haida Gwaii. In part, the objective of this research is to determine if climate change is resulting in Yellow Cedar dieback.
2) Tree fertilization. Objective of determining if there is increased carbon sequestration, potential increased Green House Gas emissions form fertilization

The Plan Holder also considers climate change relating to stocking standards; however, there is little evidence now to indicate a need to adjust stocking standards for Haida Gwaii. If evidence from the current Yellow Cedar dieback research or other climate research indicates a need to change these standards, the Plan Holder will work with the Haida Nation on this stocking standard change. Changing standards may require seed source from off Haida Gwaii or the introduction of species not native to Haida Gwaii. The Haida Nation should be fully involved with these decisions.

5.0 Measures to Prevent Impact on Natural Range Barriers

For the purposes of this FSP, forage refers to forage for Range purposes only. As of the submission date of this FSP, there are no Range activities in the FSP area. As there are no objectives for forage, there are no results or strategies that relate to forage.

Measures to prevent impact on natural Range barriers are not submitted in the FSP as there currently are no agreements under FRPA within the Plan Area.

6.0 Stocking Standards

Stocking Standards - General

The Stocking Standards proposed within the FSP are based on the Reference Guide for FDP Stocking Standards[7](MOF, November 2010), as well as standards from the currently approved FSPs for the Plan Area, and the experience and local knowledge of Foresters who work in the Plan Area.

Single-Entry Dispersed Retention System Standards

Stocking standards for "variable" basal area retention (e.g., contiguous openings with >5 to <40m^2/ha) have also been included. Situations and circumstances have been included to describe where the Single-Entry Dispersed Retention System (SEDRS) stocking standards are to be applied. The intent is for the SEDRS stocking standard to be used to maintain the timber supply in areas that are otherwise constrained. Refer to Table 3, below, for a full listing of which stocking standards apply, depending on opening size or basal area retention.

As the Single Entry Dispersed Retention harvesting system approach is relatively new on Haida Gwaii, the application of the SEDRS stocking standards has been limited to a maximum of 10% of the AAC for the Plan Area. It is acknowledged that the SEDRS stocking standards will need to be reviewed in the next 5 years (i.e., at the end of the term of the FSP), including a review of any Timber Supply impacts.

It should be noted that the SEDRS stocking standards presented here are based on the work done by the Coast Region FRPA Implementation Team – Silviculture Working Group, as presented in the "Single Entry Dispersed Retention System Stocking Standard Discussion Paper" (November 2009)[8]. They are intended to be consistent with the direction provided in this discussion paper.

Stocking Standards Application

It should be noted that prior to harvesting timber under the Single Entry Dispersed Retention System, the Plan Holder will need to clearly delineate the objectives for the harvest area, including specifying the stocking standards, acceptable leave tree characteristics, and basal area retention targets. Once harvesting is complete, the Plan Holder will need to do a post-harvest evaluation of the Standards Unit and assess the timber retained. Where "first pass" harvesting does not meet the requirements set out in the applicable stocking standard, additional harvest entries may be required (including subsequent re-evaluation).

Table 3: Stocking Standards Application.

Contiguous Opening Size for Standard Unit (ha)	Standard Unit Basal Area Retention (m^2/ha)	Applicable Stocking Standard
0.1 – 0.9	> 5 to < 40	SEDRS
0.1 – 0.9	≤ 5	Even-Aged
≥ 1.0	≥ 40	-
≥ 1.0	> 5 to < 40	SEDRS
≥ 1.0	≤ 5	Even-Aged

Ecologically Acceptable Species

Ecologically suitable species are provided in the stocking standards in the Appendix. The suitability/ acceptability of regeneration will be determined in the field by a Qualified Professional based on site-specific soil moisture, nutrient, aspect, and elevation characteristics and tree performance in response to the site. Tree species that are ecologically suitable and commercially valuable are listed in the standards provided in the Appendix.

It should be noted that while the concept of preferred and acceptable species was commonly used in

previous FSPs, recently tenure holders have moved away from this prescriptive approach and towards allowing the prescribing Forester to determine the appropriate species selections for a site (as detailed within the Site Plan), based on which species are ecologically suitable for the ecotype, as detailed within the FSP stocking standards. It should also be noted that the Establishment to Free Growing Guidebook: Vancouver Forest Region[10] (MOF V2.3, October 2007) states that both "Preferred" and "Acceptable" species, "are ecologically suited to the site" (pg. 6–7). The difference between "Preferred" and "Acceptable" has to do with management activities, not ecological suitability. For the stocking standards for this FSP, the ecologically suitable species for a given BEC unit are simply a combination of the "Preferred" and "Acceptable" species.

The Plan Holder does not intend to change the way they manage their silviculture obligations under the proposed stocking standards. Prompt reforestations efforts will be maintained, primarily through planting. Prescribing Foresters will focus on matching the most appropriate tree species to the reforestation sites, without compromising the economic value of future stands (i.e., match the best tree species to the given site; avoid conversion of cedar stands to hemlock).

Given that the Plan Holder must ensure that crop trees (at Free Growing) must be of good form and vigour, free from competition, and expected to remain so, it can reasonably be expected that they will manage reforested areas such that tree species are well suited/adapted to their sites.

Free-Growing Heights

Free-Growing heights have been established based on previously approved FSPs, as well as local knowledge and experience. While some Free-Growing heights may deviate from FDP stocking standard guides, at the time of Free-Growing the trees must still be of good form and vigour, ensuring that they are well adapted to their sites. Additionally, the trees that are accepted at Free-Growing must be reasonably expected to continue growing well and be part of the stand at rotation age (i.e., be above brush competition and no longer under deer browse pressure).

As Free-Growing declarations must be signed off by Registered Professional Foresters or Registered Forest Technologists, there is a professional reliance safeguard in place to ensure that crop trees are well suited to their growing sites and expected to remain so into the future.

Sitka Spruce (Ss)

Free-Growing heights for Sitka Spruce are reduced as indicated, given the reduction in brush competition (as a result of deer browse). While the height requirement is reduced, the performance expectations are still such that acceptable trees must be of good form and vigour and reasonably expected to continue growing well.

Red and Yellow Cedar (Cw and Yc)

Free-Growing Heights for cedar are provided, consistent with the cedar regeneration objective, above. While cedar Free-Growing heights are reduced from FDP stocking standard guides, the performance expectations are still such that acceptable trees must be of good form and vigour and reasonably expected to continue growing well. Furthermore, the 1.2m minimum height will ensure that the cedar are above deer browse height.

Minimum Inter-Tree Distance Exceptions

Exceptions to the standard 2.0m inter-tree distance have been included for situations where plantable spots may be limited in availability. By reducing the minimum inter-tree distance, the Plan Holder will be able to utilize the best available growing sites, ensuring effective reforestation.

Mixed Conifer – Hardwood Management

Red Alder has been included as an ecologically suitable species for some BEC units. For these situations, the intent is for the Plan Holder to identify the hardwood management strategies and stocking standards within the Site Plan prior to harvesting. For the development area, separate stocking standards for conifers and Red Alder are to be assigned (based on a 0.25ha minimum stratum size). Where Red Alder is the leading species, the hardwood stocking standard will be applied; where it is not, it will not be accepted as a crop tree.

As mixed hardwood management is relatively new on Haida Gwaii, the application of the hardwood stocking standards has been limited to a maximum of 200ha per year, for all the Plan Holders combined. It is acknowledged that the hardwood stocking standards will need to be reviewed in the next 5 years (i.e., at the end of the term of the FSP), including a review of any Timber Supply impacts.

Free-Growing Survey System

Development areas will be pre-stratified into appropriate polygons, assigned alder or conifer stocking standards, and surveyed as separate strata, consistent with standard survey procedures and the Site Plan.

All alder and conifer plots will be tallied separately, according to the respective stocking standards, to determine the overall achievement of stocking and reporting of inventory labels for each stratum within the development area.

The mixed-wood stocking standards have been prepared, based on the work done by the Coast Region FRPA Implementation Team – Silviculture Working Group, as presented in the paper, "Hardwood Management in the Coast Forest Region[11]" (July 2011). These stocking standards are intended to be consistent with the direction provided in the Hardwood Management paper.

FSP Implementation

The Plan Holder is committed to adhering to the intent of the Haida Gwaii Implementation agreement signed March 2023.

Appendix A: Taan Watershed Tables

Table 4: Taan Area Available in Sensitive Watersheds, 2022.

WATERSHEDS - HYDROLOGIC RECOVERY ANALYSIS - TAAN - 2022 QUARTER 3
Analysis Completed: 2022 Sept 30

Key Notes:
* Watershed or subunit area minus Sched04 Type 1 & 2 Stream Buffers, FWA stream polygons, Lake polygons. This watershed or subunit area also includes a proportion of adjacent Park (Conservancy) areas if applicable, minus FWA stream polygons and Lake polygons (note: Park areas did not exclude Sched04 Type 1 & 2 Stream Buffer areas, since parks are not under an FSP).
** as per Taan FSP 2018-2023 Amendment # 3, sections: (i) S. 6.87[a] and [b]; (ii) S. 6.92
See raw GDB for data sources.

Watershed	Sensitive	Watershed Analysis Area (ha)*	Forest cover allowed for harvest must be less than (%)**	ECA not hydrologically recovered (ha)	Area already harvested (%)	Area available for harvest (%)	Area available for harvest must be less than** (ha)	Harvest Availablilty
Aero Camp Residual1	No	1456.8	30	129.0	8.9	21.1	308.0	Available for Harvest
Aero Camp Residual2	No	1726.6	30	42.3	2.4	27.6	475.7	Available for Harvest
Ain River	Yes	1282.5	20	114.2	8.9	11.1	142.3	Available for Harvest
Alliford Bay Residual1	No	1078.9	30	58.9	5.5	24.5	264.8	Available for Harvest
Alliford Bay Residual2	No	717.7	30	60.7	8.5	21.5	154.6	Available for Harvest
Alliford Bay Residual4	No	138.1	30	7.6	5.5	24.5	33.8	Available for Harvest
Awun River1	Yes	1446.6	20	240.6	16.6	3.4	48.7	Available for Harvest
Awun River2	Yes	1027.1	20	107.3	10.5	9.5	98.1	Available for Harvest
Awun River3	Yes	2047.6	20	230.9	11.3	8.7	178.6	Available for Harvest
Baxter Creek	Yes	230.2	20	0.3	0.1	19.9	45.7	Available for Harvest
Beattie Anchorage Residual1	Yes	1650.2	20	54.4	3.3	16.7	275.7	Available for Harvest
Beattie Anchorage Residual2	No	1498.9	30	68.6	4.6	25.4	381.1	Available for Harvest
Begbie Penninsula Residual2	No	859.4	30	68.8	8.0	22.0	189.0	Available for Harvest

Begbie Penninsula Residual3	No	1319.4	30	55.5	4.2	25.8	340.3	Available for Harvest
Begbie Penninsula Residual6	No	1138.5	30	152.2	13.4	16.6	189.3	Available for Harvest
Begbie Penninsula Residual7	No	1199.2	30	121.8	10.2	19.8	238.0	Available for Harvest
Bill Creek	No	10.7	30	2.6	24.4	5.6	0.6	Available for Harvest
Black Bear Creek	No	1472.4	30	249.8	17.0	13.0	191.9	Available for Harvest
Blackwater Creek	Yes	2823.5	20	361.0	12.8	7.2	203.7	Available for Harvest
Blaine Creek	No	520.7	30	67.8	13.0	17.0	88.4	Available for Harvest
Bonanza Creek1	No	52.9	30	2.8	5.4	24.6	13.0	Available for Harvest
Bonanza Creek2	Yes	0.4	20	0.0	13.4	6.6	0.0	Available for Harvest
Breaker Bay Creek	No	1185.0	30	14.2	1.2	28.8	341.3	Available for Harvest
Breaker Bay Creek Residual1	No	1187.1	30	47.2	4.0	26.0	308.9	Available for Harvest
Brent Creek	Yes	21.6	20	4.0	18.6	1.4	0.3	Available for Harvest
Brian Creek2	No	61.5	30	11.6	18.9	11.1	6.9	Available for Harvest
Buckley Bay Residual1	No	2509.2	30	214.9	8.6	21.4	537.8	Available for Harvest
Canyon Creek	Yes	2175.5	20	219.9	10.1	9.9	215.2	Available for Harvest
Chadsey Creek	No	12.7	30	0.0	0.0	30.0	3.8	Available for Harvest
Chinukundl Creek	Yes	1865.4	20	19.8	1.1	18.9	353.3	Available for Harvest
Cohoe Creek	No	1036.4	30	63.9	6.2	23.8	247.0	Available for Harvest
Cowhoe Bay Residual2	No	1391.8	30	165.8	11.9	18.1	251.8	Available for Harvest
Cowhoe Bay Residual3	No	1371.8	30	203.7	14.8	15.2	207.9	Available for Harvest
Crease Creek	No	2252.4	30	41.4	1.8	28.2	634.3	Available for Harvest
Daltlaman Creek Residual	No	10.4	30	0.0	0.0	30.0	3.1	Available for Harvest
Datlaman Creek1	No	904.7	30	104.9	11.6	18.4	166.5	Available for Harvest
Datlaman Creek2	No	2185.0	30	219.0	10.0	20.0	436.5	Available for Harvest
Deena Creek1	Yes	14.1	20	1.0	6.8	13.2	1.9	Available for Harvest
Deena Creek2	Yes	41.8	20	1.3	3.1	16.9	7.1	Available for Harvest
Deena Creek3	Yes	119.3	20	10.6	8.9	11.1	13.2	Available for Harvest
Demon Creek	Yes	1155.1	20	164.0	14.2	5.8	67.0	Available for Harvest
Dinan Bay Residual1	No	2101.9	30	160.6	7.6	22.4	470.0	Available for Harvest
Dinan Bay Residual2	No	844.4	30	130.9	15.5	14.5	122.5	Available for Harvest

Dinan Creek	No	1194.3	30	81.9	6.9	23.1	276.3	Available for Harvest
Feather Creek1	No	1155.8	30	126.3	10.9	19.1	220.5	Available for Harvest
Feather Creek2	No	2983.6	30	105.1	3.5	26.5	790.0	Available for Harvest
Florence Creek1	No	1250.3	30	88.8	7.1	22.9	286.3	Available for Harvest
Florence Creek2	No	2255.8	30	308.7	13.7	16.3	368.1	Available for Harvest
Geike Creek	No	2260.8	30	26.1	1.2	28.8	652.1	Available for Harvest
Ghost Creek	Yes	2776.3	20	349.9	12.6	7.4	205.3	Available for Harvest
Gold Creek	Yes	2452.4	20	284.5	11.6	8.4	206.0	Available for Harvest
Gray Bay Cumshewa Residual1	No	931.5	30	59.9	6.4	23.6	219.5	Available for Harvest
Gray Bay Cumshewa Residual2	No	1646.9	30	0.0	0.0	30.0	494.1	Available for Harvest
Gray Bay Cumshewa Residual3	No	2347.5	30	49.9	2.1	27.9	654.4	Available for Harvest
Gregory Creek	No	5.2	30	0.1	1.4	28.6	1.5	Available for Harvest
Haans Creek	Yes	2578.2	20	170.4	6.6	13.4	345.2	Available for Harvest
Haans Creek Residual3	No	35.1	30	0.5	1.3	28.7	10.1	Available for Harvest
Hangover Creek	No	0.9	30	0.0	0.3	29.7	0.3	Available for Harvest
Harrison Island Residual	No	210.7	30	0.0	0.0	30.0	63.2	Available for Harvest
Hayward Creek	No	1014.5	30	119.2	11.8	18.2	185.1	Available for Harvest
Heather Lake	No	725.1	30	137.4	18.9	11.1	80.1	Available for Harvest
Honna River1	Yes	1540.1	20	174.7	11.3	8.7	133.4	Available for Harvest
Ian Lake Residual	No	1866.2	30	133.1	7.1	22.9	426.7	Available for Harvest
Ian Lake1	No	1549.8	30	158.1	10.2	19.8	306.9	Available for Harvest
Ian Lake2	No	1410.3	30	219.9	15.6	14.4	203.2	Available for Harvest
Ian Lake3	No	1704.0	30	153.8	9.0	21.0	357.5	Available for Harvest
Ian Lake4	No	2047.1	30	95.5	4.7	25.3	518.6	Available for Harvest
Ian Northeast	No	653.6	30	74.4	11.4	18.6	121.7	Available for Harvest
Ira Creek	No	1362.8	30	159.3	11.7	18.3	249.5	Available for Harvest
Jason Creek	No	1.2	30	0.0	0.0	30.0	0.4	Available for Harvest
Jungle Creek	No	1121.9	30	51.5	4.6	25.4	285.1	Available for Harvest
Keats Creek	Yes	157.6	20	1.3	0.8	19.2	30.2	Available for Harvest
King Creek	Yes	1904.9	20	179.8	9.4	10.6	201.2	Available for Harvest

Kumdis Creek Residual2	No	47.4	30	1.3	2.8	27.2	12.9	Available for Harvest
Kumdis Creek1	No	819.8	30	68.4	8.3	21.7	177.5	Available for Harvest
Kumdis Creek2	No	2218.1	30	131.4	5.9	24.1	534.0	Available for Harvest
Kumdis Island1	No	2929.2	30	0.9	0.0	30.0	877.9	Available for Harvest
Lagoon Creek	Yes	1.3	20	0.0	0.0	20.0	0.3	Available for Harvest
Lagoon Inlet Residual1	No	140.7	30	0.0	0.0	30.0	42.2	Available for Harvest
Lawn Hill Residual2	No	269.7	30	17.0	6.3	23.7	63.9	Available for Harvest
Lawn Hill Residual3	No	501.2	30	10.8	2.2	27.8	139.5	Available for Harvest
Lawn Hill Residual4	No	234.2	30	28.1	12.0	18.0	42.2	Available for Harvest
Lella Creek1	No	137.2	30	0.0	0.0	30.0	41.2	Available for Harvest
Lella Creek3	No	3415.0	30	12.4	0.4	29.6	1012.1	Available for Harvest
Lignite Creek6	No	10.1	30	0.0	0.0	30.0	3.0	Available for Harvest
Log Creek1	No	1122.6	30	183.7	16.4	13.6	153.1	Available for Harvest
Log Creek2	No	2031.4	30	131.7	6.5	23.5	477.7	Available for Harvest
Log Creek3	No	1062.2	30	202.2	19.0	11.0	116.4	Available for Harvest
Lower Tlell River1	No	739.9	30	1.2	0.2	29.8	220.7	Available for Harvest
Lower Tlell River2	No	1320.6	30	7.4	0.6	29.4	388.8	Available for Harvest
Lower Tlell River3	No	1131.6	30	48.6	4.3	25.7	290.9	Available for Harvest
Lower Tlell River4	No	1310.9	30	71.4	5.4	24.6	321.9	Available for Harvest
Lower Yakoun River1	No	1280.0	30	53.4	4.2	25.8	330.6	Available for Harvest
Lower Yakoun River2	Yes	1559.3	20	127.8	8.2	11.8	184.1	Available for Harvest
Lower Yakoun River3	Yes	1555.8	20	127.4	8.2	11.8	183.7	Available for Harvest
Mamin River1	Yes	2621.9	20	269.1	10.3	9.7	255.3	Available for Harvest
Mamin River2	Yes	1774.0	20	185.0	10.4	9.6	169.8	Available for Harvest
Mamin River3	Yes	1854.9	20	214.3	11.6	8.4	156.6	Available for Harvest
Mamin River4	Yes	1119.2	20	159.5	14.2	5.8	64.4	Available for Harvest
Mamin River5	Yes	1764.0	20	129.6	7.3	12.7	223.2	Available for Harvest
Martin Creek	Yes	1642.5	20	142.9	8.7	11.3	185.6	Available for Harvest
Mathers Creek1	Yes	2478.0	20	128.9	5.2	14.8	366.7	Available for Harvest
Mathers Creek2	Yes	1086.1	20	84.0	7.7	12.3	133.2	Available for Harvest

Mathers Creek3	Yes	1390.7	20	37.3	2.7	17.3	240.8	Available for Harvest
Mathers Creek4	Yes	1716.9	20	41.7	2.4	17.6	301.7	Available for Harvest
Mayer Lake2	No	1396.2	30	36.1	2.6	27.4	382.7	Available for Harvest
Mayer Lake3	No	793.3	30	0.0	0.0	30.0	238.0	Available for Harvest
Mayer Lake4	No	488.9	30	0.0	0.0	30.0	146.7	Available for Harvest
McClinton Bay Residual1	No	1021.3	30	116.6	11.4	18.6	189.8	Available for Harvest
McClinton Bay Residual2	No	1253.3	30	271.6	21.7	8.3	104.4	Available for Harvest
McClinton Bay Residual3	No	155.6	30	10.7	6.9	23.1	36.0	Available for Harvest
McClinton Creek	No	889.0	30	23.8	2.7	27.3	242.9	Available for Harvest
Miller Creek	No	513.0	30	3.8	0.7	29.3	150.1	Available for Harvest
Mosquito Lake1	Yes	868.2	20	57.7	6.6	13.4	116.0	Available for Harvest
Mosquito Lake2	Yes	880.7	20	57.7	6.5	13.5	118.5	Available for Harvest
Mosquito Lake4	Yes	139.2	20	1.5	1.1	18.9	26.4	Available for Harvest
Naden River4	Yes	2.6	20	0.0	0.0	20.0	0.5	Available for Harvest
Newcombe Peak Residual3	No	1848.3	30	2.1	0.1	29.9	552.4	Available for Harvest
Nina Creek	Yes	1648.8	20	119.8	7.3	12.7	209.9	Available for Harvest
Parsons Creek	Yes	264.0	20	40.8	15.5	4.5	12.0	Available for Harvest
Phantom Creek	Yes	1530.4	20	148.6	9.7	10.3	157.4	Available for Harvest
Queen Charlotte Skidegate Residual1	Yes	308.4	20	0.9	0.3	19.7	60.7	Available for Harvest
Queen Charlotte Skidegate Residual2	Yes	227.0	20	0.0	0.0	20.0	45.4	Available for Harvest
Queen Charlotte Skidegate Residual3	Yes	11.0	20	0.0	0.2	19.8	2.2	Available for Harvest
Riley Creek	Yes	6.7	20	0.0	0.0	20.0	1.3	Available for Harvest
Rockfish Harbour Residual1	No	1687.0	30	72.0	4.3	25.7	434.1	Available for Harvest
Rockfish Harbour Residual2	No	2622.9	30	127.9	4.9	25.1	659.0	Available for Harvest
Roy Lake3	No	44.5	30	0.0	0.0	30.0	13.3	Available for Harvest
Sachs Creek	No	1314.7	30	101.4	7.7	22.3	293.0	Available for Harvest
Sandstone Creek	No	1090.2	30	0.0	0.0	30.0	327.1	Available for Harvest

Shale Creek	Yes	1264.2	20	77.1	6.1	13.9	175.8	Available for Harvest
Shields Bay Residual1	No	165.9	30	1.5	0.9	29.1	48.3	Available for Harvest
Skedans Creek1	No	1482.4	30	91.6	6.2	23.8	353.1	Available for Harvest
Skedans Creek2	No	1549.0	30	144.8	9.3	20.7	319.9	Available for Harvest
Skedans Creek3	Yes	1454.4	20	66.9	4.6	15.4	224.0	Available for Harvest
Skidegate Lake Residual1	Yes	816.3	20	62.2	7.6	12.4	101.0	Available for Harvest
Skidegate Lake Residual2	Yes	1706.8	20	108.7	6.4	13.6	232.7	Available for Harvest
Survey Creek1	No	1201.4	30	48.8	4.1	25.9	311.6	Available for Harvest
Survey Creek2	No	1297.4	30	7.9	0.6	29.4	381.3	Available for Harvest
Survey Creek3	No	1225.1	30	181.6	14.8	15.2	185.9	Available for Harvest
Talking Bear Creek	Yes	1582.7	20	183.6	11.6	8.4	132.9	Available for Harvest
Tara Creek1	No	141.6	30	9.7	6.8	23.2	32.8	Available for Harvest
Tara Creek2	No	1370.5	30	49.9	3.6	26.4	361.3	Available for Harvest
Tartu Inlet Head Creek	No	1.9	30	0.0	0.0	30.0	0.6	Available for Harvest
Tartu Inlet Outer Creek	No	7.6	30	0.2	3.2	26.8	2.0	Available for Harvest
Three Mile Creek	No	1431.8	30	223.7	15.6	14.4	205.8	Available for Harvest
Towustasin Hill Residual2	No	661.1	30	44.5	6.7	23.3	153.8	Available for Harvest
Towustasin Hill Residual3	No	1070.0	30	146.0	13.6	16.4	175.0	Available for Harvest
Towustasin Hill Residual4	No	786.7	30	115.6	14.7	15.3	120.4	Available for Harvest
Towustasin Hill Residual5	No	984.3	30	147.4	15.0	15.0	147.9	Available for Harvest
Upper Yakoun River	Yes	1368.6	20	102.5	7.5	12.5	171.2	Available for Harvest
Walthus Island Residual	No	255.3	30	0.0	0.0	30.0	76.6	Available for Harvest
Waste Creek Residual1	No	824.3	30	53.9	6.5	23.5	193.4	Available for Harvest
Waste Creek Residual2	No	949.8	30	102.7	10.8	19.2	182.3	Available for Harvest
Waste Creek Residual3	No	758.9	30	49.4	6.5	23.5	178.3	Available for Harvest
Waterfall Creek	No	1188.0	30	151.9	12.8	17.2	204.5	Available for Harvest
Yakoun Lake1	No	386.5	30	0.0	0.0	30.0	116.0	Available for Harvest
Yakoun River1	Yes	1562.2	20	167.7	10.7	9.3	144.8	Available for Harvest
Yakoun River2	Yes	2079.4	20	214.0	10.3	9.7	201.9	Available for Harvest
Yakoun River3	Yes	820.0	20	71.7	8.7	11.3	92.3	Available for Harvest

Appendix B: Taan Watershed Subunit Hydro Recovery Table

Table 5: Taan Area Available in Watershed Subunits, 2022.

SUBUNITS - HYDROLOGIC RECOVERY ANALYSIS - TAAN - 2022 QUARTER 3 Updated Analysis Completed: 2022 Sept 30							
Key Notes: * Watershed or subunit area minus Sched04 Type 1 & 2 Stream Buffers, FWA stream polygons, Lake polygons. This watershed or subunit area also includes a proportion of adjacent Park (conservancy) areas if applicable, minus FWA stream polygons and Lake polygons (note: Park areas did not exclude Sched04 Type 1 & 2 Stream Buffer areas, since parks are not under an FSP). ** as per Taan FSP 2018-2023 Amendment # 3, sections: (i) S. 6.87[a] and [b]; (ii) S. 6.92 See raw GDB for data sources.							
Subunit	**Subunit Analysis Area (ha)***	**Forest cover allowed for harvest must be less than (%)****	**ECA not hydrologically recovered (ha)**	**Area already harvested (%)**	**Area available for harvest (%)**	**Area available for harvest must be less than (ha)****	**Harvest Availability**
119	0.0	30	0.0	0.0	30.0	0.0	At Threshold
124	0.0	30	0.0	0.0	30.0	0.0	At Threshold
128	141.6	30	9.7	6.8	23.2	32.8	Available for Harvest
132	293.6	30	2.7	0.9	29.1	85.4	Available for Harvest
136	778.2	30	46.2	5.9	24.1	187.3	Available for Harvest
139	44.5	30	0.0	0.0	30.0	13.3	Available for Harvest
141	8.4	30	0.0	0.0	30.0	2.5	Available for Harvest
142	444.0	30	2.7	0.6	29.4	130.5	Available for Harvest
145	169.0	30	26.3	15.6	14.4	24.4	Available for Harvest
146	276.1	30	22.4	8.1	21.9	60.5	Available for Harvest
147	1.7	30	0.0	0.3	29.7	0.5	Available for Harvest
148	356.8	30	22.1	6.2	23.8	84.9	Available for Harvest
152	771.6	30	111.8	14.5	15.5	119.6	Available for Harvest
153	546.0	30	59.6	10.9	19.1	104.2	Available for Harvest
155	5.6	30	2.2	40.2	-10.2	-0.6	Over Threshold
156	307.5	30	18.1	5.9	24.1	74.1	Available for Harvest

160	1336.5	30	27.0	2.0	28.0	373.9	Available for Harvest
163	915.9	30	14.4	1.6	28.4	260.4	Available for Harvest
164	2.6	30	0.0	0.0	30.0	0.8	Available for Harvest
165	961.5	30	106.0	11.0	19.0	182.5	Available for Harvest
167	5.1	30	0.4	7.4	22.6	1.2	Available for Harvest
169	482.1	30	100.6	20.9	9.1	44.0	Available for Harvest
170	320.9	30	8.2	2.6	27.4	88.1	Available for Harvest
171	527.2	30	35.3	6.7	23.3	122.8	Available for Harvest
172	928.2	30	119.3	12.9	17.1	159.1	Available for Harvest
173	502.3	30	45.0	9.0	21.0	105.7	Available for Harvest
174	891.7	30	66.0	7.4	22.6	201.6	Available for Harvest
175	981.5	30	96.1	9.8	20.2	198.4	Available for Harvest
176	334.5	30	41.8	12.5	17.5	58.6	Available for Harvest
178	529.3	30	34.7	6.6	23.4	124.1	Available for Harvest
179	477.8	30	46.0	9.6	20.4	97.3	Available for Harvest
180	660.9	30	46.8	7.1	22.9	151.5	Available for Harvest
181	866.4	30	67.7	7.8	22.2	192.3	Available for Harvest
183	488.9	30	0.0	0.0	30.0	146.7	Available for Harvest
185	1180.7	30	27.9	2.4	27.6	326.4	Available for Harvest
186	128.3	30	6.8	5.3	24.7	31.7	Available for Harvest
187	521.0	30	30.3	5.8	24.2	126.0	Available for Harvest
188	477.8	30	23.8	5.0	25.0	119.5	Available for Harvest
189	673.3	30	51.6	7.7	22.3	150.4	Available for Harvest
190	1036.4	30	63.9	6.2	23.8	247.0	Available for Harvest
191	691.5	30	61.7	8.9	21.1	145.8	Available for Harvest
192	688.8	30	109.6	15.9	14.1	97.0	Available for Harvest
193	556.1	30	102.6	18.4	11.6	64.3	Available for Harvest
194	370.7	30	42.1	11.4	18.6	69.1	Available for Harvest
195	661.0	30	35.2	5.3	24.7	163.1	Available for Harvest
196	411.2	30	0.0	0.0	30.0	123.4	Available for Harvest
197	653.6	30	18.4	2.8	27.2	177.7	Available for Harvest

198	806.7	30	56.8	7.0	23.0	185.2	Available for Harvest
199	857.6	30	125.7	14.7	15.3	131.6	Available for Harvest
200	1108.8	30	66.7	6.0	24.0	265.9	Available for Harvest
201	793.3	30	0.0	0.0	30.0	238.0	Available for Harvest
202	1354.2	30	72.7	5.4	24.6	333.6	Available for Harvest
203	757.8	30	131.0	17.3	12.7	96.3	Available for Harvest
204	454.9	30	38.3	8.4	21.6	98.2	Available for Harvest
205	1027.1	30	107.3	10.5	19.5	200.8	Available for Harvest
206	804.7	30	111.0	13.8	16.2	130.4	Available for Harvest
207	786.7	30	115.6	14.7	15.3	120.4	Available for Harvest
208	742.6	30	17.7	2.4	27.6	205.1	Available for Harvest
209	427.2	30	0.4	0.1	29.9	127.7	Available for Harvest
210	705.3	30	8.5	1.2	28.8	203.0	Available for Harvest
211	589.3	30	53.6	9.1	20.9	123.2	Available for Harvest
212	778.0	30	72.6	9.3	20.7	160.8	Available for Harvest
213	909.3	30	11.4	1.2	28.8	261.4	Available for Harvest
214	543.9	30	0.0	0.0	30.0	163.2	Available for Harvest
215	376.6	30	1.2	0.3	29.7	111.8	Available for Harvest
216	450.5	30	61.0	13.6	16.4	74.1	Available for Harvest
217	500.9	30	91.3	18.2	11.8	59.0	Available for Harvest
218	846.4	30	141.5	16.7	13.3	112.4	Available for Harvest
219	567.9	30	25.7	4.5	25.5	144.7	Available for Harvest
220	1003.1	30	95.6	9.5	20.5	205.3	Available for Harvest
221	1127.5	30	169.3	15.0	15.0	168.9	Available for Harvest
222	863.9	30	58.7	6.8	23.2	200.4	Available for Harvest
223	721.9	30	0.0	0.0	30.0	216.6	Available for Harvest
224	734.3	30	61.9	8.4	21.6	158.4	Available for Harvest
225	687.2	30	60.7	8.8	21.2	145.5	Available for Harvest
226	904.7	30	104.9	11.6	18.4	166.5	Available for Harvest
227	1122.6	30	183.7	16.4	13.6	153.1	Available for Harvest
228	677.2	30	49.5	7.3	22.7	153.7	Available for Harvest

229	1215.1	30	176.5	14.5	15.5	188.0	Available for Harvest
230	575.0	30	43.2	7.5	22.5	129.3	Available for Harvest
231	737.2	30	7.4	1.0	29.0	213.8	Available for Harvest
232	559.5	30	68.9	12.3	17.7	99.0	Available for Harvest
233	524.0	30	39.9	7.6	22.4	117.3	Available for Harvest
234	1.9	30	0.0	0.0	30.0	0.6	Available for Harvest
235	717.5	30	51.6	7.2	22.8	163.6	Available for Harvest
236	605.3	30	88.9	14.7	15.3	92.7	Available for Harvest
237	1339.1	30	145.9	10.9	19.1	255.8	Available for Harvest
238	583.4	30	0.0	0.0	30.0	175.0	Available for Harvest
239	426.7	30	48.3	11.3	18.7	79.7	Available for Harvest
241	850.6	30	118.9	14.0	16.0	136.3	Available for Harvest
242	368.2	30	47.3	12.9	17.1	63.1	Available for Harvest
244	696.8	30	93.2	13.4	16.6	115.9	Available for Harvest
245	1014.4	30	119.2	11.7	18.3	185.1	Available for Harvest
246	846.0	30	73.0	8.6	21.4	180.7	Available for Harvest
247	568.8	30	70.5	12.4	17.6	100.2	Available for Harvest
248	642.7	30	91.0	14.2	15.8	101.8	Available for Harvest
249	6.6	30	0.2	3.7	26.3	1.7	Available for Harvest
250	363.3	30	0.0	0.0	30.0	109.0	Available for Harvest
251	642.8	30	99.2	15.4	14.6	93.6	Available for Harvest
252	742.9	30	0.0	0.0	30.0	222.9	Available for Harvest
253	777.7	30	111.8	14.4	15.6	121.5	Available for Harvest
254	709.0	30	44.5	6.3	23.7	168.2	Available for Harvest
255	590.9	30	58.0	9.8	20.2	119.3	Available for Harvest
256	418.1	30	67.8	16.2	13.8	57.6	Available for Harvest
257	486.2	30	44.5	9.2	20.8	101.3	Available for Harvest
258	1388.7	30	40.6	2.9	27.1	376.0	Available for Harvest
259	606.7	30	58.8	9.7	20.3	123.3	Available for Harvest
260	829.9	30	56.0	6.7	23.3	193.0	Available for Harvest
261	51.8	30	2.8	5.4	24.6	12.8	Available for Harvest

262	454.0	30	75.8	16.7	13.3	60.4	Available for Harvest
264	1062.2	30	202.2	19.0	11.0	116.4	Available for Harvest
265	388.7	30	48.6	12.5	17.5	68.1	Available for Harvest
266	1.0	30	0.0	0.0	30.0	0.3	Available for Harvest
267	494.5	30	88.2	17.8	12.2	60.1	Available for Harvest
268	826.9	30	75.9	9.2	20.8	172.2	Available for Harvest
269	457.0	30	51.0	11.2	18.8	86.1	Available for Harvest
270	0.9	30	0.0	0.3	29.7	0.3	Available for Harvest
271	864.4	30	159.0	18.4	11.6	100.3	Available for Harvest
272	539.9	30	48.5	9.0	21.0	113.5	Available for Harvest
273	451.3	30	20.9	4.6	25.4	114.5	Available for Harvest
274	557.2	30	115.5	20.7	9.3	51.7	Available for Harvest
275	937.1	30	53.7	5.7	24.3	227.5	Available for Harvest
276	866.6	30	103.0	11.9	18.1	157.0	Available for Harvest
277	608.0	30	90.8	14.9	15.1	91.6	Available for Harvest
278	1.1	30	0.1	5.7	24.3	0.3	Available for Harvest
280	592.8	30	54.2	9.1	20.9	123.6	Available for Harvest
281	533.0	30	21.4	4.0	26.0	138.5	Available for Harvest
282	0.0	30	0.0	0.0	30.0	0.0	At Threshold
283	667.7	30	48.5	7.3	22.7	151.8	Available for Harvest
284	624.8	30	71.2	11.4	18.6	116.2	Available for Harvest
285	716.2	30	62.7	8.8	21.2	152.2	Available for Harvest
286	771.0	30	22.9	3.0	27.0	208.4	Available for Harvest
287	0.4	30	0.0	13.4	16.6	0.1	Available for Harvest
290	1204.6	30	139.0	11.5	18.5	222.4	Available for Harvest
291	491.5	30	39.3	8.0	22.0	108.2	Available for Harvest
292	529.3	30	4.0	0.8	29.2	154.8	Available for Harvest
293	700.3	30	40.8	5.8	24.2	169.3	Available for Harvest
295	700.8	30	77.8	11.1	18.9	132.4	Available for Harvest
297	903.8	30	185.0	20.5	9.5	86.2	Available for Harvest
298	209.3	30	14.7	7.0	23.0	48.1	Available for Harvest

299	455.0	30	48.5	10.7	19.3	88.0	Available for Harvest
300	0.7	30	0.0	0.0	30.0	0.2	Available for Harvest
301	834.8	30	42.7	5.1	24.9	207.7	Available for Harvest
303	230.1	30	9.6	4.2	25.8	59.4	Available for Harvest
304	269.7	30	17.0	6.3	23.7	63.9	Available for Harvest
305	1103.0	30	57.5	5.2	24.8	273.4	Available for Harvest
307	688.6	30	69.7	10.1	19.9	136.9	Available for Harvest
308	1045.8	30	5.0	0.5	29.5	308.8	Available for Harvest
309	122.6	30	7.1	5.8	24.2	29.7	Available for Harvest
310	2.5	30	0.0	0.0	30.0	0.8	Available for Harvest
311	654.6	30	91.3	13.9	16.1	105.1	Available for Harvest
313	137.2	30	0.0	0.0	30.0	41.2	Available for Harvest
315	1201.4	30	48.8	4.1	25.9	311.6	Available for Harvest
316	991.1	30	160.2	16.2	13.8	137.1	Available for Harvest
318	337.9	30	42.5	12.6	17.4	58.8	Available for Harvest
319	2.0	30	0.1	3.7	26.3	0.5	Available for Harvest
321	207.8	30	6.1	2.9	27.1	56.3	Available for Harvest
322	421.7	30	60.1	14.2	15.8	66.4	Available for Harvest
323	658.4	30	83.2	12.6	17.4	114.4	Available for Harvest
324	19.0	30	3.4	18.0	12.0	2.3	Available for Harvest
325	293.4	30	4.8	1.6	28.4	83.3	Available for Harvest
327	496.6	30	80.9	16.3	13.7	68.1	Available for Harvest
329	429.1	30	95.9	22.3	7.7	32.9	Available for Harvest
330	721.8	30	0.0	0.0	30.0	216.5	Available for Harvest
332	6.7	30	0.0	0.0	30.0	2.0	Available for Harvest
333	21.6	30	4.0	18.6	11.4	2.5	Available for Harvest
334	129.4	30	12.4	9.6	20.4	26.4	Available for Harvest
335	718.2	30	87.2	12.1	17.9	128.3	Available for Harvest
338	551.4	30	51.8	9.4	20.6	113.6	Available for Harvest
339	683.5	30	49.6	7.3	22.7	155.4	Available for Harvest
340	575.6	30	7.9	1.4	28.6	164.7	Available for Harvest

342	1140.9	30	0.0	0.0	30.0	342.3	Available for Harvest
344	386.5	30	0.0	0.0	30.0	116.0	Available for Harvest
345	506.9	30	94.4	18.6	11.4	57.6	Available for Harvest
346	549.8	30	0.9	0.2	29.8	164.0	Available for Harvest
347	438.4	30	1.9	0.4	29.6	129.6	Available for Harvest
349	1469.9	30	3.6	0.2	29.8	437.4	Available for Harvest
350	1090.2	30	0.0	0.0	30.0	327.1	Available for Harvest
353	804.2	30	8.8	1.1	28.9	232.4	Available for Harvest
355	125.9	30	26.9	21.3	8.7	10.9	Available for Harvest
356	624.7	30	1.2	0.2	29.8	186.3	Available for Harvest
360	567.7	30	101.9	18.0	12.0	68.4	Available for Harvest
361	89.5	30	8.9	9.9	20.1	18.0	Available for Harvest
363	756.0	30	1.1	0.1	29.9	225.7	Available for Harvest
368	295.0	30	18.3	6.2	23.8	70.2	Available for Harvest
369	461.9	30	18.7	4.0	26.0	119.9	Available for Harvest
370	484.7	30	17.6	3.6	26.4	127.8	Available for Harvest
382	1052.8	30	24.2	2.3	27.7	291.6	Available for Harvest
383	0.1	30	0.0	0.0	30.0	0.0	At Threshold
384	34.9	30	0.5	1.3	28.7	10.0	Available for Harvest
385	759.1	30	56.8	7.5	22.5	171.0	Available for Harvest
387	605.0	30	78.1	12.9	17.1	103.4	Available for Harvest
388	498.9	30	63.6	12.8	17.2	86.0	Available for Harvest
389	21.8	30	4.2	19.0	11.0	2.4	Available for Harvest
390	555.6	30	44.7	8.0	22.0	122.0	Available for Harvest
391	1.8	30	0.2	12.9	17.1	0.3	Available for Harvest
394	920.4	30	68.1	7.4	22.6	208.0	Available for Harvest
395	0.7	30	0.0	2.4	27.6	0.2	Available for Harvest
397	31.1	30	0.0	0.0	30.0	9.3	Available for Harvest
398	0.2	30	0.0	0.0	30.0	0.1	Available for Harvest
399	448.2	30	36.0	8.0	22.0	98.4	Available for Harvest
400	264.0	30	40.8	15.5	14.5	38.4	Available for Harvest

401	1.8	30	0.1	5.7	24.3	0.4	Available for Harvest
406	157.3	30	1.3	0.8	29.2	45.9	Available for Harvest
407	195.4	30	0.0	0.0	30.0	58.6	Available for Harvest
408	743.6	30	28.2	3.8	26.2	194.9	Available for Harvest
409	119.3	30	10.6	8.9	21.1	25.2	Available for Harvest
412	13.4	30	0.9	7.0	23.0	3.1	Available for Harvest
414	41.8	30	1.3	3.1	26.9	11.2	Available for Harvest
415	405.1	30	31.5	7.8	22.2	90.0	Available for Harvest
416	475.1	30	77.3	16.3	13.7	65.2	Available for Harvest
418	368.1	30	26.2	7.1	22.9	84.2	Available for Harvest
419	672.7	30	18.7	2.8	27.2	183.2	Available for Harvest
421	868.2	30	57.7	6.6	23.4	202.8	Available for Harvest
422	432.6	30	38.3	8.9	21.1	91.5	Available for Harvest
423	467.9	30	107.4	22.9	7.1	33.0	Available for Harvest
424	250.0	30	60.1	24.0	6.0	14.9	Available for Harvest
425	681.7	30	0.0	0.0	30.0	204.5	Available for Harvest
426	774.2	30	39.1	5.1	24.9	193.1	Available for Harvest
427	724.0	30	68.1	9.4	20.6	149.1	Available for Harvest
428	452.8	30	25.1	5.5	24.5	110.8	Available for Harvest
429	145.9	30	6.9	4.7	25.3	36.9	Available for Harvest
431	0.0	30	0.0	0.0	30.0	0.0	At Threshold
432	1.2	30	0.0	0.0	30.0	0.4	Available for Harvest
434	139.2	30	1.5	1.1	28.9	40.3	Available for Harvest
441	833.7	30	70.1	8.4	21.6	180.0	Available for Harvest
442	3.6	30	0.0	0.0	30.0	1.1	Available for Harvest
445	459.0	30	65.0	14.2	15.8	72.7	Available for Harvest
446	789.7	30	20.6	2.6	27.4	216.3	Available for Harvest
447	673.3	30	32.5	4.8	25.2	169.5	Available for Harvest
448	627.1	30	19.0	3.0	27.0	169.1	Available for Harvest
449	9.0	30	0.0	0.0	30.0	2.7	Available for Harvest
450	854.6	30	38.2	4.5	25.5	218.2	Available for Harvest

452	507.8	30	56.2	11.1	18.9	96.2	Available for Harvest
453	442.1	30	46.5	10.5	19.5	86.1	Available for Harvest
455	717.4	30	4.8	0.7	29.3	210.4	Available for Harvest
456	688.1	30	69.3	10.1	19.9	137.1	Available for Harvest
457	1.3	30	0.0	0.0	30.0	0.4	Available for Harvest
458	847.2	30	82.7	9.8	20.2	171.5	Available for Harvest
460	861.4	30	19.5	2.3	27.7	238.9	Available for Harvest
463	794.4	30	22.3	2.8	27.2	216.0	Available for Harvest
464	511.3	30	50.9	10.0	20.0	102.4	Available for Harvest
465	688.1	30	42.4	6.2	23.8	164.0	Available for Harvest
467	855.5	30	22.1	2.6	27.4	234.5	Available for Harvest
468	956.9	30	35.7	3.7	26.3	251.4	Available for Harvest
472	460.0	30	0.0	0.0	30.0	138.0	Available for Harvest
473	725.0	30	14.2	2.0	28.0	203.3	Available for Harvest
495	2214.1	30	0.9	0.0	30.0	663.3	Available for Harvest
496	986.8	30	63.2	6.4	23.6	232.8	Available for Harvest
497	78.0	30	5.8	7.5	22.5	17.6	Available for Harvest
500	496.2	30	76.0	15.3	14.7	72.9	Available for Harvest
501	398.9	30	66.1	16.6	13.4	53.6	Available for Harvest
502	296.3	30	31.2	10.5	19.5	57.7	Available for Harvest
503	215.7	30	9.5	4.4	25.6	55.2	Available for Harvest
504	152.0	30	3.8	2.5	27.5	41.8	Available for Harvest
507	95.1	30	2.8	2.9	27.1	25.8	Available for Harvest
510	99.9	30	7.4	7.4	22.6	22.5	Available for Harvest
512	273.5	30	54.1	19.8	10.2	28.0	Available for Harvest
513	237.5	30	0.0	0.0	30.0	71.3	Available for Harvest
514	346.6	30	36.4	10.5	19.5	67.5	Available for Harvest
515	281.0	30	9.4	3.3	26.7	74.9	Available for Harvest
516	748.3	30	5.1	0.7	29.3	219.3	Available for Harvest
517	241.9	30	0.0	0.0	30.0	72.6	Available for Harvest
518	1269.8	30	37.3	2.9	27.1	343.7	Available for Harvest

519	824.3	30	53.9	6.5	23.5	193.4	Available for Harvest
520	318.0	30	2.1	0.6	29.4	93.3	Available for Harvest
521	751.1	30	0.0	0.0	30.0	225.3	Available for Harvest
522	186.4	30	19.4	10.4	19.6	36.5	Available for Harvest
523	14.7	30	0.2	1.5	28.5	4.2	Available for Harvest
524	719.1	30	31.3	4.4	25.6	184.4	Available for Harvest
525	429.4	30	7.8	1.8	28.2	121.0	Available for Harvest
526	1723.2	30	90.0	5.2	24.8	427.0	Available for Harvest
562	1996.6	30	166.6	8.3	21.7	432.4	Available for Harvest
568	844.4	30	130.9	15.5	14.5	122.5	Available for Harvest
569	47.4	30	1.3	2.8	27.2	12.9	Available for Harvest
570	255.3	30	0.0	0.0	30.0	76.6	Available for Harvest
571	673.6	30	171.8	25.5	4.5	30.3	Available for Harvest
572	49.2	30	0.9	1.7	28.3	13.9	Available for Harvest
574	859.4	30	68.8	8.0	22.0	189.0	Available for Harvest
576	1319.4	30	55.5	4.2	25.8	340.3	Available for Harvest
579	1391.8	30	165.8	11.9	18.1	251.8	Available for Harvest
580	1138.5	30	152.2	13.4	16.6	189.3	Available for Harvest
581	1371.8	30	203.7	14.8	15.2	207.9	Available for Harvest
583	155.6	30	10.7	6.9	23.1	36.0	Available for Harvest
585	210.7	30	0.0	0.0	30.0	63.2	Available for Harvest
587	237.5	30	53.5	22.5	7.5	17.7	Available for Harvest
588	500.4	30	62.5	12.5	17.5	87.6	Available for Harvest
589	984.3	30	147.4	15.0	15.0	147.9	Available for Harvest
590	10.4	30	0.0	0.0	30.0	3.1	Available for Harvest
598	151.6	30	1.5	1.0	29.0	44.0	Available for Harvest
601	234.2	30	28.1	12.0	18.0	42.2	Available for Harvest
608	66.4	30	0.3	0.4	29.6	19.7	Available for Harvest
609	3.1	30	0.0	0.0	30.0	0.9	Available for Harvest
611	11.0	30	0.0	0.2	29.8	3.3	Available for Harvest
623	517.4	30	32.1	6.2	23.8	123.1	Available for Harvest

624	130.7	30	4.3	3.3	26.7	35.0	Available for Harvest
631	181.2	30	17.7	9.8	20.2	36.7	Available for Harvest
632	85.2	30	4.3	5.1	24.9	21.2	Available for Harvest
647	446.5	30	0.0	0.0	30.0	133.9	Available for Harvest
648	364.5	30	0.0	0.0	30.0	109.3	Available for Harvest
650	2347.5	30	49.9	2.1	27.9	654.4	Available for Harvest
661	1498.9	30	68.6	4.6	25.4	381.1	Available for Harvest
670	140.7	30	0.0	0.0	30.0	42.2	Available for Harvest
674	707.7	30	34.1	4.8	25.2	178.2	Available for Harvest
726	715.2	30	0.0	0.0	30.0	214.5	Available for Harvest
729	453.4	30	49.6	10.9	19.1	86.4	Available for Harvest
730	512.6	30	48.3	9.4	20.6	105.4	Available for Harvest
731	583.7	30	41.9	7.2	22.8	133.2	Available for Harvest
732	525.1	30	40.6	7.7	22.3	117.0	Available for Harvest
734	530.5	30	99.0	18.7	11.3	60.1	Available for Harvest
735	504.0	30	24.4	4.8	25.2	126.8	Available for Harvest
736	332.1	30	30.0	9.0	21.0	69.6	Available for Harvest
737	293.3	30	31.2	10.6	19.4	56.8	Available for Harvest
741	14.3	30	0.0	0.0	30.0	4.3	Available for Harvest
742	417.9	30	1.1	0.3	29.7	124.3	Available for Harvest
743	238.8	30	0.7	0.3	29.7	71.0	Available for Harvest
744	227.0	30	0.0	0.0	30.0	68.1	Available for Harvest
746	430.9	30	22.6	5.2	24.8	106.7	Available for Harvest
748	451.3	30	38.7	8.6	21.4	96.7	Available for Harvest
750	10.0	30	0.2	2.0	28.0	2.8	Available for Harvest
751	28.2	30	0.0	0.0	30.0	8.5	Available for Harvest
752	420.5	30	5.8	1.4	28.6	120.3	Available for Harvest
753	523.0	30	23.7	4.5	25.5	133.2	Available for Harvest
754	306.3	30	59.5	19.4	10.6	32.4	Available for Harvest
755	371.1	30	37.1	10.0	20.0	74.2	Available for Harvest
756	365.4	30	0.0	0.0	30.0	109.6	Available for Harvest

757	391.5	30	0.0	0.0	30.0	117.5	Available for Harvest
758	444.5	30	0.0	0.0	30.0	133.3	Available for Harvest
759	380.4	30	17.1	4.5	25.5	97.0	Available for Harvest
760	779.2	30	0.0	0.0	30.0	233.8	Available for Harvest
761	557.8	30	29.7	5.3	24.7	137.6	Available for Harvest
762	538.4	30	32.8	6.1	23.9	128.7	Available for Harvest
764	479.4	30	13.1	2.7	27.3	130.7	Available for Harvest
765	899.7	30	37.9	4.2	25.8	232.0	Available for Harvest

Appendix C: Taan Cutblock Area Table

Table 6: Planned Block Shapes as of Jan 2022 (subject to change).

Block ID	Status	Area (ha)
AWN014	Cutting Permit Approved	15.8
BER002s	Cutting Permit Approved	1.9
BER003s	Cutting Permit Approved	1.2
DEM003	Cutting Permit Approved	21.7
IAN019	Cutting Permit Approved	31.8
KNG004	Cutting Permit Approved	38.8
LAW005s	Cutting Permit Approved	0.8
LAW006	Cutting Permit Approved	29.9
LAW099s	Cutting Permit Approved	2.0
LOG012s	Cutting Permit Approved	3.0
LOG014s	Cutting Permit Approved	3.7
LOG016s	Cutting Permit Approved	3.7
LOG018s	Cutting Permit Approved	4.7
LYK116s	Cutting Permit Approved	1.2

LYK117s	Cutting Permit Approved	1.4
LYK118s	Cutting Permit Approved	1.4
LYK119s	Cutting Permit Approved	1.4
LYK120s	Cutting Permit Approved	1.6
LYK121s	Cutting Permit Approved	2.7
MAM007	Cutting Permit Approved	27.4
MAM008	Cutting Permit Approved	31.1
MAT015	Cutting Permit Approved	4.6
SHN001	Cutting Permit Approved	37.1
SUR002	Cutting Permit Approved	35.7
YAK022s	Cutting Permit Approved	1.0
YAK023s	Cutting Permit Approved	1.7
YAK024s	Cutting Permit Approved	1.5
YAK025s	Cutting Permit Approved	1.2
YAK026s	Cutting Permit Approved	2.2
YAK027s	Cutting Permit Approved	2.9

Appendix D: Active Fluvial Units updated 2016

Updated June 2016 for Haida Gwaii

Glynnis Horel, P. Eng.
G.M. Horel Engineering Services Ltd.

Active fluvial units include alluvial streams and their associated active floodplains, and active fans. They are of special significance because of the high ecological values often associated with them; and because the behaviour or character of these features might well be changed through harvesting. The critical deposits are those where erosion within the rooting depth is likely if the trees are removed; or in the case of active fans, where removal of trees can allow increased spread of sediment and debris deposition on the fan surface.

An initial identification of potential active fluvial units is typically done using office-based information (e.g., air photos, topography, hill shade, and stream patterns); but requires field verification to delineate the extent of the active portion of the unit. Features of these types occur across the landscape at all scales, from high energy fans and large floodplains to small low-energy features on S6 upland streams.

STREAM CHANNEL TYPES

There are a number of stream classification systems in the scientific literature for denoting the physical attributes of channels and surrounding valley forms. For the purpose of forest management, and for identifying active fluvial units under the Haida Gwaii Land Use Objectives Order, coastal B.C. streams are categorized into three types based on characteristics relevant to forest management of coastal streams. The main distinction between the types is susceptibility to channel bank erosion and channel disturbance. This is consistent with the principles of the CIT Technical Report #3 (Church and Eaton 2004)[1]. For clarity, definitions for the stream types used in this document are provided in Table 6"Alluvial" streams are those with alluvial channel bed and bank material, where one or both banks are in alluvial deposits – **these are active fluvial units**. "Semi-alluvial" streams are low-gradient streams (less than 8%) in confined channels with fluvially transported bed material and non-alluvial banks, or banks in glaciofluvial terraces that no longer inundate (e.g., were not formed by the contemporary stream). "Non-alluvial" streams are typically steeper gradient streams that are bedrock or boulder controlled but may have forced alluvial or semi-alluvial morphologies at choke points ("vertical jams"); or have log steps that store sediment. Low-gradient streams that have primarily bedrock or boulder-dominated channels are also non-alluvial streams.

[1]Coast Information Team reports prepared for ecosystem-based management, 2004.

ALLUVIAL STREAMS AND THEIR FLOODPLAINS

The importance of forests on floodplains

Because stream floodplains are composed of materials deposited by the contemporary stream, these materials can be moved by the stream. Thus, they are susceptible to erosion during peak stream flows. In large alluvial streams, riparian forests provide critical erosion resistance in the rooting zone along channel banks. They also provide large wood debris (LWD) which has many functions depending on the size of the alluvial stream; and is crucial for channel morphology and habitat features. During overbank flows in flood events, both LWD and the standing riparian forest provide roughness to the surface of the floodplain and slow the velocity of stream flow, thus reducing its erosive power.

The portion of the floodplain area that floods frequently (typically within 5 years) is the most vulnerable to forest removal and to other disturbances. If this zone is logged, severe effects (significant channel widening, aggradation, loss of channel structure) often occur within a few years with normal peak flows. Large alluvial streams may take many decades to recover from these effects.

Identifying the active floodplain

The frequently flooded portion of a floodplain typically shows visible evidence of water flow or inundation (vegetative indicators, water-borne sediment, or wood debris); and includes medium bench terraces adjacent to the stream and flood channels where this evidence is apparent.

In an extensive floodplain with multiple stepped benches or terraces, an extreme event such as a 100-year flood may inundate a much larger area than the frequently flooded zone. During an extreme event, the stream may completely change its location within the floodplain.

The Haida Gwaii land use order defines an active floodplain to be “where water flows over land in a 1 in 100-year flood event, and includes low and medium benches…”

This provision conveys an intention to protect floodplains from these much rarer extreme events; and to ensure that, should such an event occur, and the stream channel changes location within this larger floodplain, it would still be protected by riparian forest.

On these rarely inundated parts of the floodplain there may be little physical evidence to indicate the extent of the 100-year floodplain unless there has been an extreme event within the past few years. There may be no vegetative indicators or visible signs of water-borne sediment or wood debris. Determination of the 100-year floodplain in the field can be difficult unless there is a distinct topographic break. As well, medium benches are often not continuous or well defined; terraces may be discontinuous, or with varying stepped surface elevations.

Identification of the 100-year floodplain can be aided at locations where there is a designed bridge crossing on a floodplain. Bridge designs typically include flood frequency analysis and stage-discharge determination to set the design height of the bridge. The 100-year flood elevation is usually indicated on the design drawings; however, it is usually a relative elevation to a local benchmark established for the purpose of bridge design and construction. From this, one metre lidar contours, if available, can be used to determine the absolute elevation and then extrapolate that to the limits of the floodplain. However, one cannot extrapolate this flood elevation too far upstream or downstream of the bridge

because the flood surface will be on a gradient similar to the stream gradient, and because the volume of water in the flood changes with distance along the stream channel. Note that not all bridges show a 100-year flood elevation; for example, if the bridge height is determined by the road grade well above a possible 100-year flood.

In the absence of design flood elevations, a best estimate of the 100-year floodplain can be made using the lidar hill shade image and 1 m contours, and then field checking to see if the floodplain delineated by this means appears reasonable.

Table 7: Stream Channel Types.

Alluvial Channel	Alluvial channels are active fluvial units. They have at least one unconfined erodible bank in alluvial deposits. Alluvial deposits are material that was deposited by the stream under the contemporary flow regime. The stream has an identifiable floodplain (channel migration zone) and a riffle-pool or cascade-pool channel bed with a channel gradient up to 8% but typically =<5%. Alluvial streams on fans can be steeper. The stream can erode its bank(s) and widen its channel. Riparian vegetation is critical to limit bank erosion. If there is a significant channel migration zone, stream position may change within this zone, triggered by disturbance or a large flood event. Abandoned channels or flood channels may be present. LWD is important for channel structure and habitat features. Alluvial channels are often reaches of highly productive fish habitat and are highly sensitive to disturbance such as increase in sediment, logging of riparian forest, removal of LWD from the channel, or loss of LWD supply.
Semi-alluvial Channel	Semi-alluvial channels are not active fluvial units. The channel has confining banks in non-alluvial material (e.g., till, colluvium, rock). The channel position is stable; the stream cannot move laterally beyond its active channel. The stream has a riffle-pool or cascade-pool channel bed and gradients less than 8% but typically =<5%. LWD varies from important in small channels to absent or non-functional in large channels. Quality of habitat may be affected by aggradation or scour, removal of LWD, or loss of LWD supply.
Non-alluvial Channel	Non-alluvial channels are not active fluvial units. They are typically confined to entrenched channels with a stable position, although some non-alluvial channels flowing over rock or boulders may have limited lateral confinement. Banks are resistant to erosion (such as till, colluvium, rock). Non-alluvial channels are less sensitive to disturbance than semi-alluvial or alluvial channels. Banks in non-rock material may experience minor local widening or undercutting from erosion if vegetation is removed or in extreme storm events; and may experience bed or bank scour. Non-alluvial channels are typically transport zones. LWD function depends on stream energy and channel character. LWD is non-functional in high energy non-alluvial streams but may function in small streams (especially those where gully processes occur) to trap sediment, limit scour, and control sediment transport. Channel bed is typically cascade-pool, step-pool or rock-dominated.
Wetland	Low-energy stream through wetland, typically fine-textured deposits or organic material in bed and banks.

FANS

Background

- This landform is a cone- or fan-shaped deposition area where a confined tributary enters a larger valley and becomes unconfined. The fan limits may extend to a half circle or may be limited by topography or cutting by the main valley stream to a narrow arc.

- Fans can have surface slopes up to 20^{O} (38%). Landform's steeper than this are considered cones.

- Alluvial processes dominate where the slope on the fan surface $<4^{0}$ (7%). Fans may be transitional – predominantly colluvial processes (debris flows) on the upper part of the fan, and alluvial processes on the lower fan. Between major colluvial events it is common for alluvial process to modify colluvial fans. For the purpose of defining "active fluvial units", no distinction is made between these processes.

- Fan sediments are typically coarsest at the apex, becoming finer downstream, although boulders can be scattered across the full length of debris flow fans, and entrenched streams can transport coarse material farther down the fan.

- The natural stability of a fan is related to the relative ratio of sediment and water being delivered from a watershed. Many of the fans in BC were essentially formed during deglaciation, and contemporary fan-building or fan-eroding activity is frequently limited to only a portion of the fan surface.

- Active deposition processes that originate from sources in the drainage area above the fan may be from:
    - Natural landslides – either chronic or infrequent, or
    - Land use effects such as slides from roads or cutblocks.

- A watershed that is producing more sediment relative to water usually has a shallow, poorly confined channel, with evidence of water flows and sediment accumulation on the fan surface laterally beyond the stream channel.

- A watershed that is producing more water relative to sediment usually has a channel that is entrenched. However, an entrenched channel does not always indicate a naturally stable fan. Periodic debris flows can fill a 4 m deep, entrenched channel in one event, leading to broadcasting of water and sediment.

- Debris flow levees, either recent or historic, can be features that "entrench" a channel.

- Multiple channels may be present on fan. It is common for these channels to be established historically, with water flow in any channel being the result of localized sediment accumulations (frequently associated with debris jams) that partially or totally block off flow in other channel(s).

- Consequences of logging a fan can be:
  - Nil on stable fan with stable watershed upslope and appropriate engineering and harvesting prescriptions; or
  - Destabilisation of channels because of loss of root reinforcement along channel banks, increased sediment broadcasting, or stream diversion from wood debris, inadequate drainage structures, and inappropriate road construction; and/or
  - Difficulty of reforestation due to ongoing sediment deposition.

  Destabilised fans can take decades to recover, and restoration is rarely feasible.

Definition: Fans as active fluvial units

Determination of fan characteristics and assessment of fan activity follow the hydrogeomorphic criteria from Land Management Handbook 57 (Wilford et al. 2005)[2] and Land Management Handbook 61 (Wilford et al. 2009)[3].

Based on field evidence, individual fans can be stratified into two components: inactive and active units. The "active fluvial unit" is the active component of the fan (described below).

All or parts of fan surfaces with stands 200 years and older undisturbed by visible hydrogeomorphic processes, are considered stable within the timeframe of forest management and are not "active fluvial units".

If no hydrogeomorphic processes are evident, the stream channel position is stable, and the fan is forested with stands 50 -200 years because of disturbances other than hydrogeomorphic processes such as fire, disease, or insects, then the fan is not an active fluvial unit.

If no hydrogeomorphic processes are evident, the stream channel position is stable, and the fan has been previously harvested more than 50 years ago with no evidence of post-harvesting disturbance, then the fan is not an active fluvial unit.

The active fluvial unit (rarely the whole fan surface) is defined as the "hydrogeomorphic riparian zone". This is the zone where the forest stores sediment, maintains the stream location, and reinforces the soil mass.

Identification of hydrogeomorphic riparian zone

Indicators of hydrogeomorphic processes are:

<u>Airphoto evidence</u>

- Visible sediment sources such as landslides in the watershed upstream of the fan indicate potentially high sediment loads are being delivered to the fan.

[2] Wilford, D.J., M.E. Sakals, and J.L. Innes. 2005. Forest management on fans; hydrogeomorphic hazards and general prescriptions. B.C. Min. For., Res. Br., Victoria, B.C. Land Management Handbook No. 57.
[3]Wilford, D.M., M.E. Sakals, W.W. Grainger, T.H. Millard and T.R. Giles. 2009. Managing forested watersheds for hydrogeomorphic risks on fans. B.C. Min. For. Range, For. Sci. Prog., Victoria, B.C. Land Management Handbook 61.

- Variations in forest canopy on the fan surface linked to stream channels, such as deciduous bands or bands of younger stands than the surrounding forest (cohorts) indicate either multiple channels or land-clearing by debris flows or floods.

- Multiple channels which may appear as streams radiating out from the fan apex; may be inferred by the abrupt disappearance of the main channel from the airphoto view (smaller channels under the forest canopy); or may be visible as multiple points of discharge at the lower margin of the fan.

- Visible sediment accumulation in the channels or on the fan surface.

- Visible increase in gravel bars in the main stream immediately downstream of the confluence of the fan with a larger stream.

- Abrupt angles in the stream channel on the fan indicate a high potential for channel straightening.

Field evidence

- Unconfined stream channels with evidence of periodic flow on the fan surface outside the channels.

- Recent sediment distributed through the trees. "Recent" is defined as unvegetated or with limited accumulation of organic matter.

- Log steps storing sediment and debris.

- Visible channel diversions caused by jams of wood and sediment.

- Visible channel avulsions caused by sediment infilling or by erosion of the channel banks.

- Trees with partially buried boles (as evident from lack of butt flare).

- Scars on trees from impacts by transported sediment or wood.

- Levees of sediment and/or wood debris along the channel sides.

- Wood debris in jams, dikes along the channel sides, log walls piled against trees, or on the fan surface but recently water or debris flow transported.

- Root reinforcement along channel sides or across the fan surface which may appear as a network with minor erosion behind or below the roots.

(For more detailed descriptions of the hydrogeomorphic riparian zone, refer to Land Management Handbooks 57 and 61).

The limits of the hydrogeomorphic riparian zone are defined by delineating the zone from the apex

down where these processes occur. The top of the zone is the upstream point at which it is possible for the stream to be diverted from its present channel and re-occupy an older channel on the fan surface; or to flood the fan surface; or to establish a new channel in the event of a debris flow/debris flood/ flood event. This point may be at the fan apex, or if the stream is well entrenched in the upper part of the fan (such as in a complex fan where the contemporary stream has down cut through an earlier fan formed during deglaciation), at the lower limit of entrenchment.

If no clear margins are evident (such as topographic changes) the limit of the active fluvial unit is at the transition to undisturbed forest stands 200 years or older.

Roads on fans

The preferred location to cross a fan is at the apex. Crossing at the apex limits the length of road that can be affected by fan behaviour; however, if the channel above the fan is subject to debris flows or debris floods, the structure must still be able to accommodate this. The road location to the apex should be outside the limits of the fan and not cross up the fan surface.

Where this is not feasible, a road across the surface of an active fan must be able to accommodate debris deposition and channel switching. Because fans are permeable, they may at times have significant subsurface flows that could be intercepted at road cuts and ditchlines. Ditchlines will also intercept broadcast surface flow occurring on the fan surface. If a road location crosses contours on a fan, the road ditch can encounter sufficient broadcast flow, seepage, or channelized flow to become a stream channel; or the road ditch can intercept a channel and divert the stream down the road. Channel avulsion above a road can wash out or bury a road. Active deposition can plug drainage structures or bury a road.

A road across the surface of an active fan should:

- Be located parallel to the contours to the extent possible and avoid alignments up or down the fan surface. In particular, ensure drainage structures are either on flat grades or at dips in the road gradeline.

- Minimize cuts and fills to avoid intercepting seepage; and so that debris flows/debris floods reaching the road, or new stream channels cutting across the road, cause minimal impacts that are not significantly different than the natural behaviour of the fan.

- Have drainage structures preferably designed to be overrun if this is feasible. If this is not feasible, special designs may be needed for structures to accommodate debris flows or debris floods as well as anticipated stream floods. Armouring to train stream channels or construct ditchplugs must be durable rock coarser than the fan material, properly sized and founded to resist scour and entrainment. Avoid excavating sumps at the inlets of drainage structures in active channels as these will tend to aggravate bedload mobilization.

- Avoid excavating stream channels on fans if possible. If this can't be avoided, and it is necessary to do so to control stream flow to structures, the channels must be properly designed and constructed with suitable armouring to resist erosion, and other design features as appropriate such as sub-channel groins to limit bedload mobilization. Be aware that maintaining a channel to a structure could have consequences such as increased sediment deposition downstream on the fan surface. The downstream consequences should be carefully considered when reviewing options for drainage structures.

- Be deactivated when not in active use, with drainage structures removed or backed up with cross channels.

SMALL ACTIVE FLUVIAL UNITS ON LOW-ENERGY UPLAND STREAMS

Small fans and floodplains can be found on small streams as well as large streams, including on S6 upland streams, especially where topography is highly variable. They occur at topographic widenings and gradient breaks along stream channels. There are many of these small AFU's across the landscape in Haida Gwaii. Because they lack the energy of large streams, riparian vegetation such as shrubs or young trees can be sufficient to maintain channel erosion resistance; and smaller trees can provide functioning large wood debris. Recovery of channel disturbance therefore takes place over much shorter time intervals than for large streams, often in just a few years when shrubs and young regen take hold. However, disturbance of these features (such as by yarding) can cause accelerated transport of sediment downstream until vegetation takes hold. Individually these are small sources but the cumulative effects of many such small sources can be significant with respect to sediment loading in channels downstream.

Appendix E: Assessment Form - Windthrow Assessment Summary (Feb '13)

Operation: _____ **Cutblock:** _____ **Date:** _____

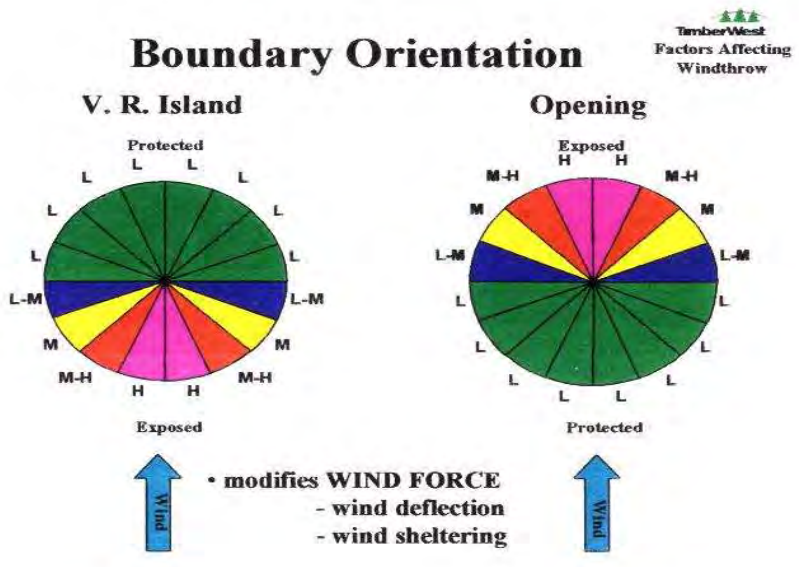
Assessment Completed by: _____

Review Completed by: _____

Windthrow Treatment Prescription:

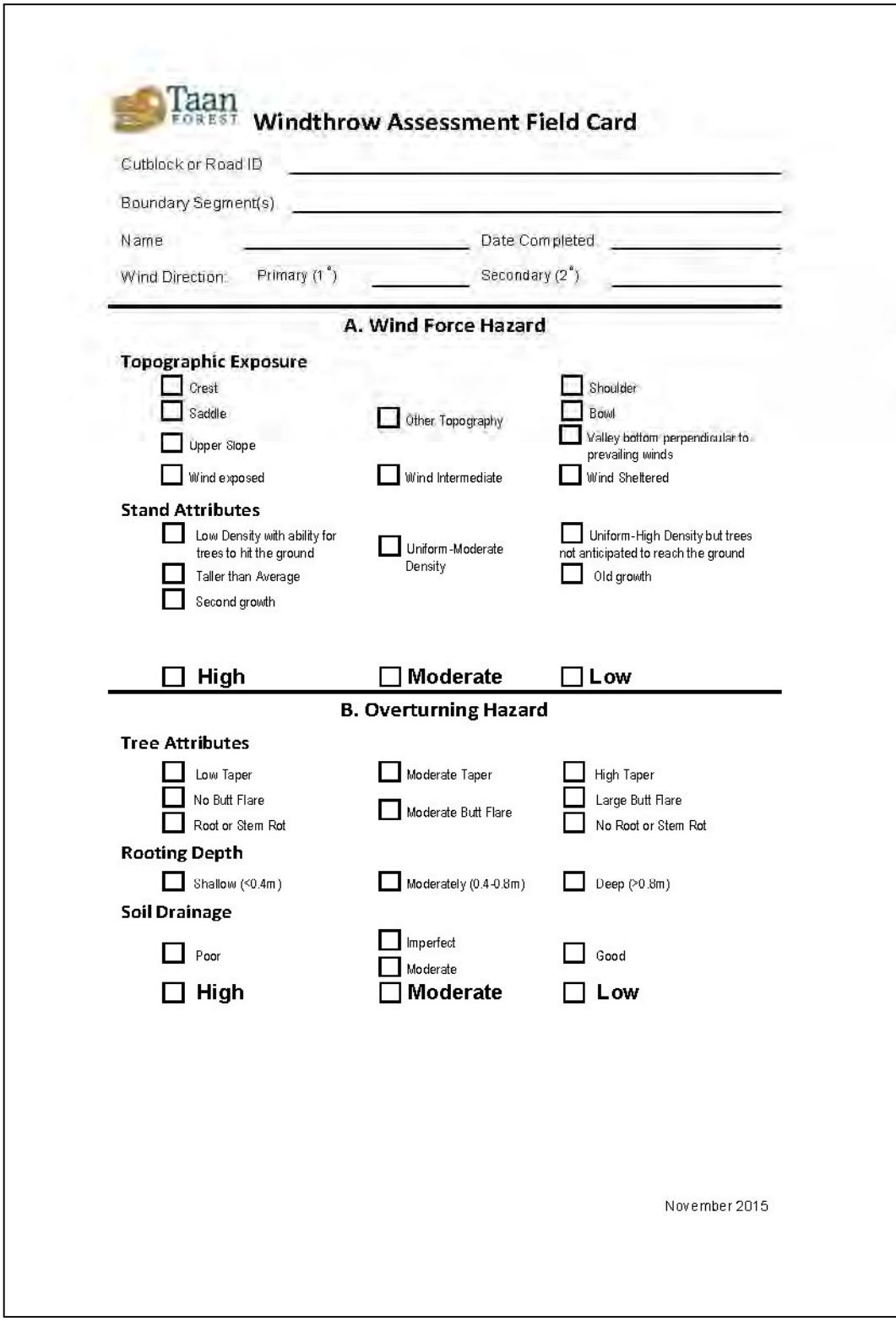
Boundary Segment	Risk Rating	Prescription
_____ to _____ _____ to _____ _____ to _____	**Low**	☐ Maintain the boundary location and avoid windthrow prone edge protrusions. ☐ Consider adjusting reserve or management zone widths/ locations (per LUO flexibility).
_____ to _____ _____ to _____ _____ to _____	**Mod**	☐ **Old Growth** ☐ Maintain boundary location and avoid windthrow prone edge protrusions. ☐ Consider adjusting reserve or management zone widths/ locations (per LUO flexibility). ☐ **Second Growth** *If there is a feature to protect:* ☐ Increase distance from the edge to the feature (use LUO flexibility and/ or consider adding additional management zone area) ☐ Prune 50% of windthrow prone trees (30% removal of live crown, 10-20m into stand) *If no feature present:* ☐ Maintain boundary location and avoid windthrow prone edge protrusions.
_____ to _____ _____ to _____ _____ to _____	**High**	☐ **Old Growth** *Cedar Stand:* ☐ Maintain boundary location and avoid windthrow prone edge protrusions. ☐ Consider adjusting reserve or management zone widths/ locations (per LUO flexibility). *Non-Cedar Stand:* ☐ Top 50% of the windthrow prone stems (remove 10% of the live crown, 20m into stand) ☐ **Second Growth** *Cedar Stand:* ☐ Prune 75% of the windthrow prone stems (30% removal of live crown, 20m into stand). *Non-Cedar Stand:* ☐ Prune 85% of the windthrow prone stems (30% removal of live crown, 20m into stand).

Comments:



Instructions: Group boundary segments according to the risk rank results from the field cards. Ensure a windthrow map is attached to show the risk rating (H red, M yellow, L green). Map must indicate direction of damaging winds.

Appendix F: Field Card - Windthrow Assessment (Nov '15)



Taan FOREST

Windthrow Assessment Field Card

Cutblock or Road ID _____

Boundary Segment(s) _____

Name _____ Date Completed _____

Wind Direction: Primary (1°) _____ Secondary (2°) _____

A. Wind Force Hazard

Topographic Exposure

- ☐ Crest
- ☐ Saddle
- ☐ Upper Slope
- ☐ Wind exposed
- ☐ Other Topography
- ☐ Wind Intermediate
- ☐ Shoulder
- ☐ Bowl
- ☐ Valley bottom perpendicular to prevailing winds
- ☐ Wind Sheltered

Stand Attributes

- ☐ Low Density with ability for trees to hit the ground
- ☐ Taller than Average
- ☐ Second growth
- ☐ Uniform-Moderate Density
- ☐ Uniform-High Density but trees not anticipated to reach the ground
- ☐ Old growth

☐ **High** ☐ **Moderate** ☐ **Low**

B. Overturning Hazard

Tree Attributes

- ☐ Low Taper
- ☐ No Butt Flare
- ☐ Root or Stem Rot
- ☐ Moderate Taper
- ☐ Moderate Butt Flare
- ☐ High Taper
- ☐ Large Butt Flare
- ☐ No Root or Stem Rot

Rooting Depth

- ☐ Shallow (<0.4m)
- ☐ Moderately (0.4-0.8m)
- ☐ Deep (>0.8m)

Soil Drainage

- ☐ Poor
- ☐ Imperfect
- ☐ Moderate
- ☐ Good

☐ **High** ☐ **Moderate** ☐ **Low**

November 2015

Appendix G: Field Card - Windthrow Prescription (Feb '12)

General Windthrow Prescription Options

Stand Type		Over-riding Windthrow Risk: Low	Over-riding Windthrow Risk: Moderate	Over-riding Windthrow Risk: High
Stand Type	Old Growth	Maintain the boundary location and avoid windthrow prone edge protrusions. Consider adjusting reserve or management zone widths/ locations (per LUO flexibility).	Maintain boundary location and avoid windthrow prone edge protrusions. Consider adjusting reserve or management zone widths/ locations (per LUO flexibility).	<u>Cedar Stand</u> - Maintain boundary location and avoid windthrow prone edge protrusions. - Consider adjusting reserve or management zone widths/ locations (per LUO flexibility). <u>Non-Cedar Stand</u> - Top 50% of the windthrow prone stems (remove 10% of the live crown, 20m into stand).
	Second Growth		<u>If there is a feature to protect</u> - Increase distance from the edge to the feature (use LUO flexibility and/ or consider adding additional management zone area) - Prune 50% of windthrow prone trees (30% removal of live crown, 10-20m into stand) <u>If no feature present</u> - Maintain boundary location and avoid windthrow prone edge protrusions.	<u>Cedar Stand</u> - Prune 75% of the windthrow prone stems (30% removal of live crown, 20m into stand). <u>Non-Cedar Stand</u> - Prune 85% of the windthrow prone stems (30% removal of live crown, 20m into stand).

February 2012

Additional Considerations

Windfirm Tree Characteristics

- Windfirm species (cedar)
- Low height to diameter ratio (i.e., short and fat)
- Dominant stand position (in multi-storey stands)
- Spike top cedar and trees with reduced live crowns

Windthrow Prone Tree Characteristics

- Windthrow prone species (Hw, Ba)
- Trees forked stems or damaged roots
- High live crown ratio
- High height to diameter ratio (i.e., tall and skinny)
- Co-dominant stand position (in multi-storey stands)
- Newly exposed, uniform edges

Retention Patches

- Patch sizes should be a minimum of 1.0ha in size (target between 1.0 to 3.0ha).

Pruning

- Consider the potential impacts to features or values if blow-down occurs beyond pruned edge (pruning in high risk situations can increase windthrow penetration further into the stand)

February 2012

Appendix H: SOP - Monumentals (Nov '16)

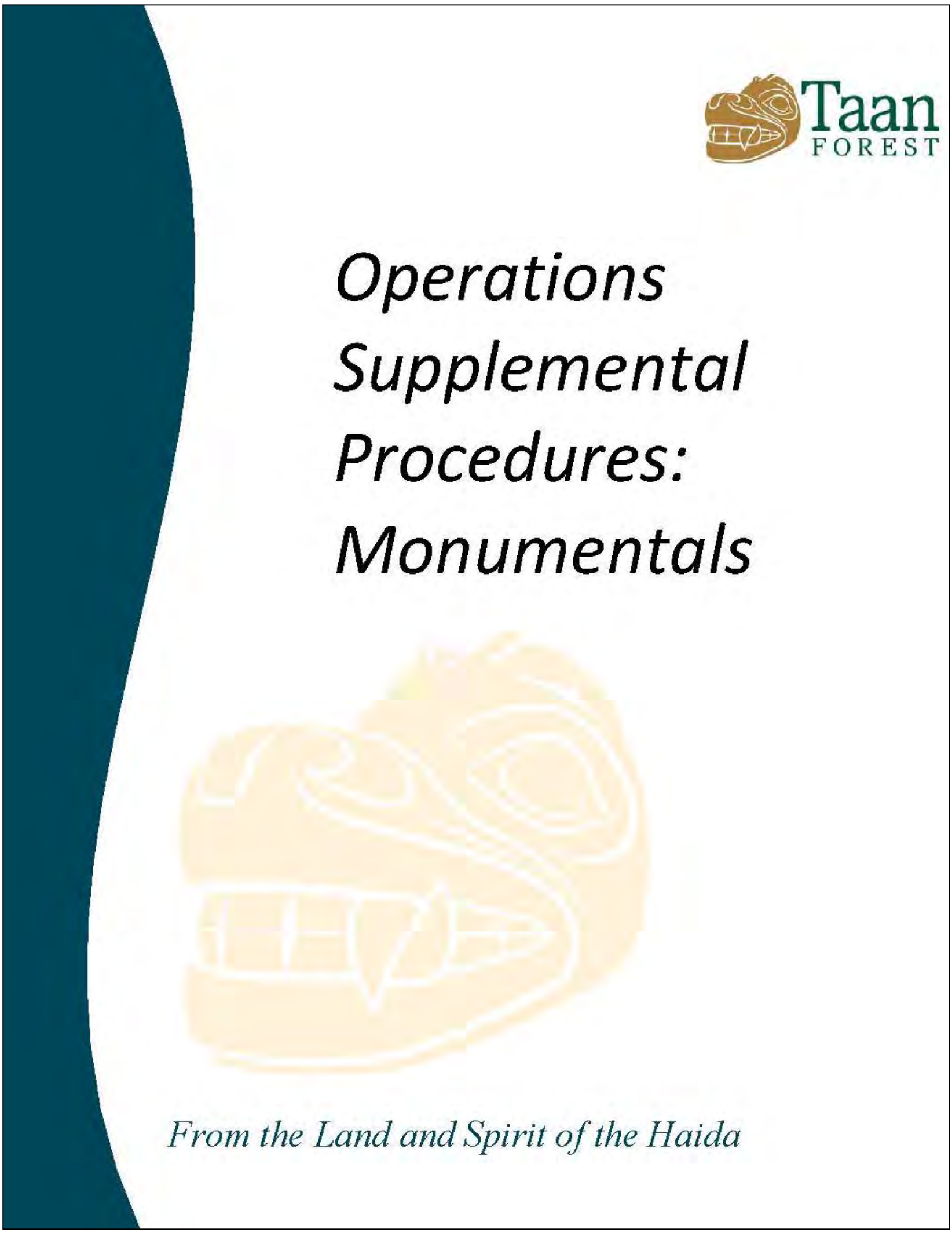


Table of Contents

Introduction

Objective

The following *Operations Supplemental Procedures: Monumentals* is developed specifically for Taan Forest LP and its Contractors
The objective of these Procedures are to:

- Provide written guidance to employees and contractors for the harvesting, tracking and documentation of Monumentals from when they're standing in the forest until the time they leave the sort

Scope

These procedures apply to all Taan operational activities including the following:

- Falling
- Transportation
- Sorting
- Scaling
- Haida Gwaii Cultural Wood Access Program (HGCWAP) Process

Health and Safety are the first priorities. Under no circumstances are these procedures to replace, or come before Taan Forest's Health and Safety Policy or Standard Operating Procedures. These Procedures apply to all Taan Forest personnel, including employees, consultants and contractors working within Taan Forest Tenures

Harvesting

Documentation

A *Monumental Tracking* form must be completed for each Monumental designated for harvest in a cutblock.

- The forms will be provided to the fallers, by a Taan Supervisor, during the pre-work meeting for the block
- Completed forms are to be forwarded to a Taan representative within 3 business days of falling
- Forms will be provided to the harvesting crew's Foreman, by a Taan representative, upon commencement of harvesting
- It is then the responsibility of the Foreman to ensure that each monumental is accounted for through the subsequent phases of yarding, hauling and arriving to the sort
- Completed forms are to be forwarded to a Taan representative within 3 business days of the Monumental being hauled to the sort

Pre-Falling

When Falling Monumental Trees, fallers must follow the *Harvesting Instructions* as written on the back of the block map. A Taan Supervisor must be notified prior to falling the tree and a representative from Taan and the HGCWAP must be present on site. Alternatively, clear written directions specific to each tree may be given from Taan Supervisors on how to handle the tree (bucking, marking etc.), if the representatives are unavailable

- Confirm the Monumental Tree number in the field matches the Monumental Tree number to be harvested as indicated on the Plan/ Map
- Monumentals are indicated on the *Harvesting Instructions Map* with the following symbols:
  - Monumental Cedar(>120cm DBH)
  - Monumental Cedar(<120cm DBH)
- Specific instructions pertaining to the Monumentals that are to be harvested can be found on the back of the *Harvesting and/ or Road Instructions Map* under the 'Monumental Cedar & Cultural Heritage Features' section

Falling

Safety is the first priority. If, for any reason, the Monumental cannot be felled safely inform the Taan Supervisor and/ or representative of the Haida Gwaii Cultural Wood Access Program (HGCWAP) immediately to come up with a plan

- Use extreme care when falling the Monumental to avoid damage, shatter or breakage.
- Where possible, do not fall other trees on top of the Monumental. If there is a potential problem notify the Taan Supervisor immediately

Post-Falling, Bucking & Limbing

- Limb the tree without damaging the stem. Buck according to the bucking lengths provided by the HGCWAP
- In blue paint, fallers must paint the top and side faces of the log with:
  - Block number
  - Monumental Tree number (MT#)
  - In addition to marking the log with paint, the block number and Monumental number should be notched into the butt of the log using a chainsaw (if safe to do so)

Image 1: Example of proper labeling notched into the butt; Monumental # and Block # (M27 & PHT4).

Transportation

Handling should be minimized during yarding, loading and hauling phases to reduce damage to the log

Yarding

- Caution should be taken to avoid damage to the log (e.g. grapple marks, adequate deflection, etc.). Windrow logs to keep separated at roadside, where possible
- Handle with care not to gauge or break the stem
- Place in safe area at roadside for ease of loading
- Monumental trees will receive the Timber Mark associated with the block
- Ensure tree is still appropriately marked as specified above

Loading & Hauling

- Monumental logs should be loaded one end at a time and placed on the bottom of the load to reduce damage during transportation
- Take measures to prevent binder straps from digging into stem
- On the way to the sort notify the Sort Supervisor via radio that the load contains a Monumental

Arrival to Sort

A Taan representative is to be notified as new Monumental cedar logs arrive at the sort

Sorting

- The Dry-land Sort (DLS) crew must ensure that Monumental cedar are handled with care to avoid damage
- Monumentals are to be stored together at the DLS in their designated location:

Skidegate Sort – West end along the edge of the sort

When a truckload of Monumentals are at the sort, and upon direction given by a Taan representative the logs will be transported to the MFLNRO compound behind the Ministry office

Ferguson Sort – Compound in the southwest edge of the sort near the trailer reload area

McClinton Sort – Area near entrance to bunkhouse site in the northeast portion of the sort

Dinan Sort – Along treeline on the northwest side of the sort

Louise Sort – Southwest side of the sort

Scaling

- All Monumental logs are to be scaled & tagged
- The scaling tag must be securely fastened to the log so it remains in place
- Ensure that all identifying markings (block number, Monumental number & tag number) are still visible and legible; re-mark if necessary

Tracking & Purchasing

Tracking

It is important to ensure that these procedures are followed for efficient tracking and complete documentation of Monumentals from the time they are standing until they leave the sort. It is crucial that proper marking is maintained throughout this entire process

- Upon notification of the arrival of a Monumental to the sort, a Taan representative will collect and record information to maintain an inventory on the Monumentals
- Information Collected:
  - Block number
  - Monumental Tree (MT) number
  - Species
  - Scaling Tag number
- The scaling tag number is then used to look up scaling specifications from NetScale
- All of the information collected is entered into a spreadsheet that is submitted periodically to the Haida Gwaii Cultural Wood Access Program (HGCWAP)
- This spreadsheet can be found on the Taan Server under:
  Y:\Corporate\22-Cultural Wood Program\01-Inventory

Purchasing

After a purchaser has been approved for a Monumental through the application process with the HGCWAP, they need to arrange for payment and pick-up of that log:

- The HGCWAP coordinator notifies the Taan representative of an approved applicant and the Monumental they're interested in purchasing

- Upon requesting an invoice to be made, provide the log inventory accountant with the following information:
  - Legal name of purchaser (personal or business)
  - Current address
  - Monumental tag number
- An invoice is created by the log inventory accountant based on a pre-determined per cubic meter rate and the volume of wood as determined during the scaling of that log
- Invoices will be provided to the purchaser by the log inventory accountant
- Payments can be made either by mail or in person at the Taan Forest office in Skidegate
  - Only cheque or money order are accepted; **cash or credit card cannot be processed**
- Once payment is received, a receipt will be provided. That receipt is required for the release of the log from the DLS
- Pick-up can be arranged with a Taan Harvesting Supervisor
- Load slips for the transportation of Monumentals must be Ministry (MFLNRO) approved (generally books provided by MFLNRO or truck drivers carry them) and are legally required documentation that must remain with the log during transportation
  - Load slips must be appropriately filled out by Sort and/or Taan Supervisors

Release from HGCWAP

- Monumentals will be available to the HGCWAP process for 6 months from the date the trees arrive at the sort
- If Monumentals are not allocated for use during that timeframe or if at any time, the coordinator of the HGCWAP determines they are not suitable for use, they will be re-scaled and released to be put back into production by the licensee

Appendix I: VQOs

Figure 2: VQO Overview Graham North compact.

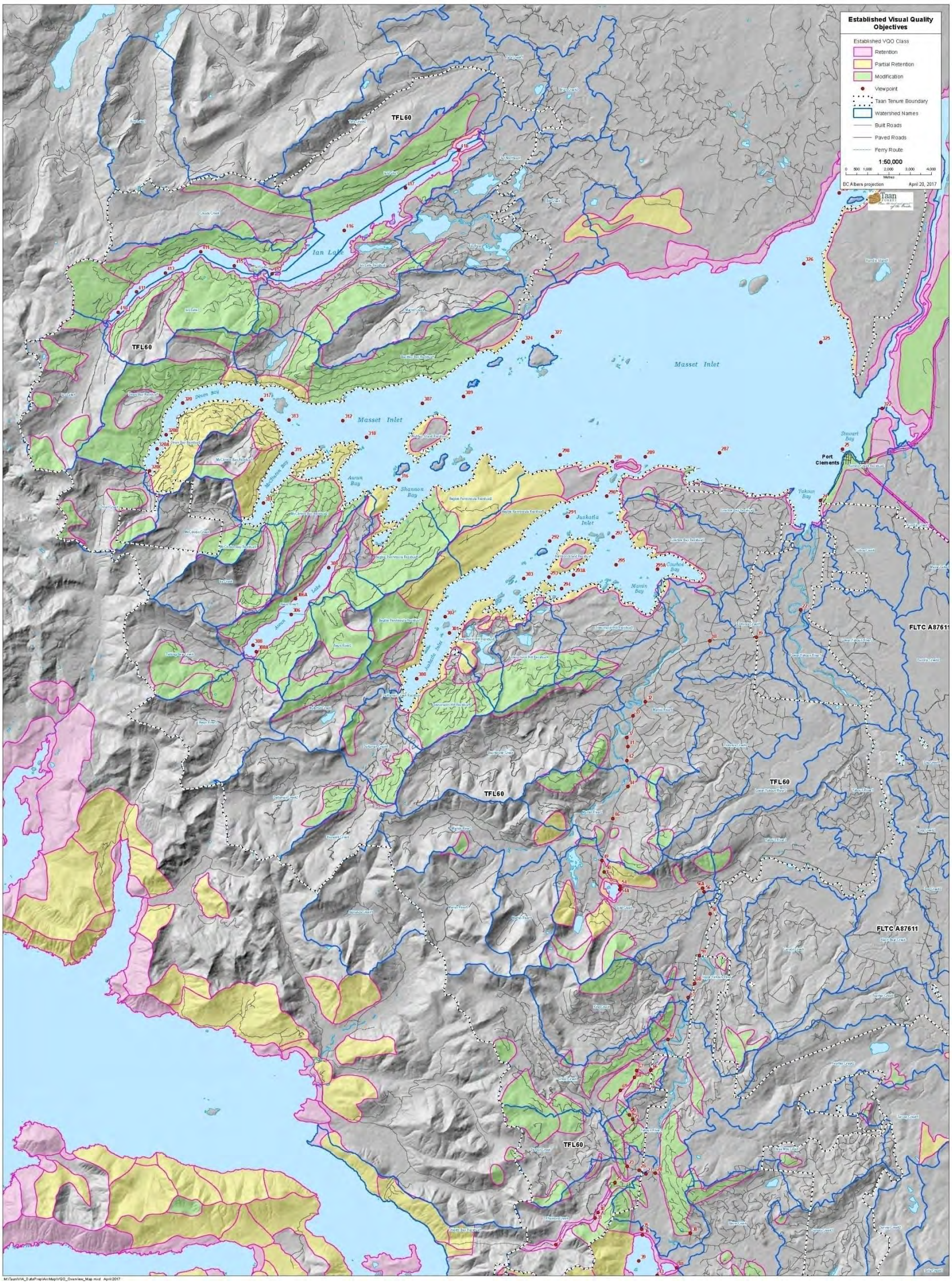


Figure 3: VQO Overview Graham South compact.

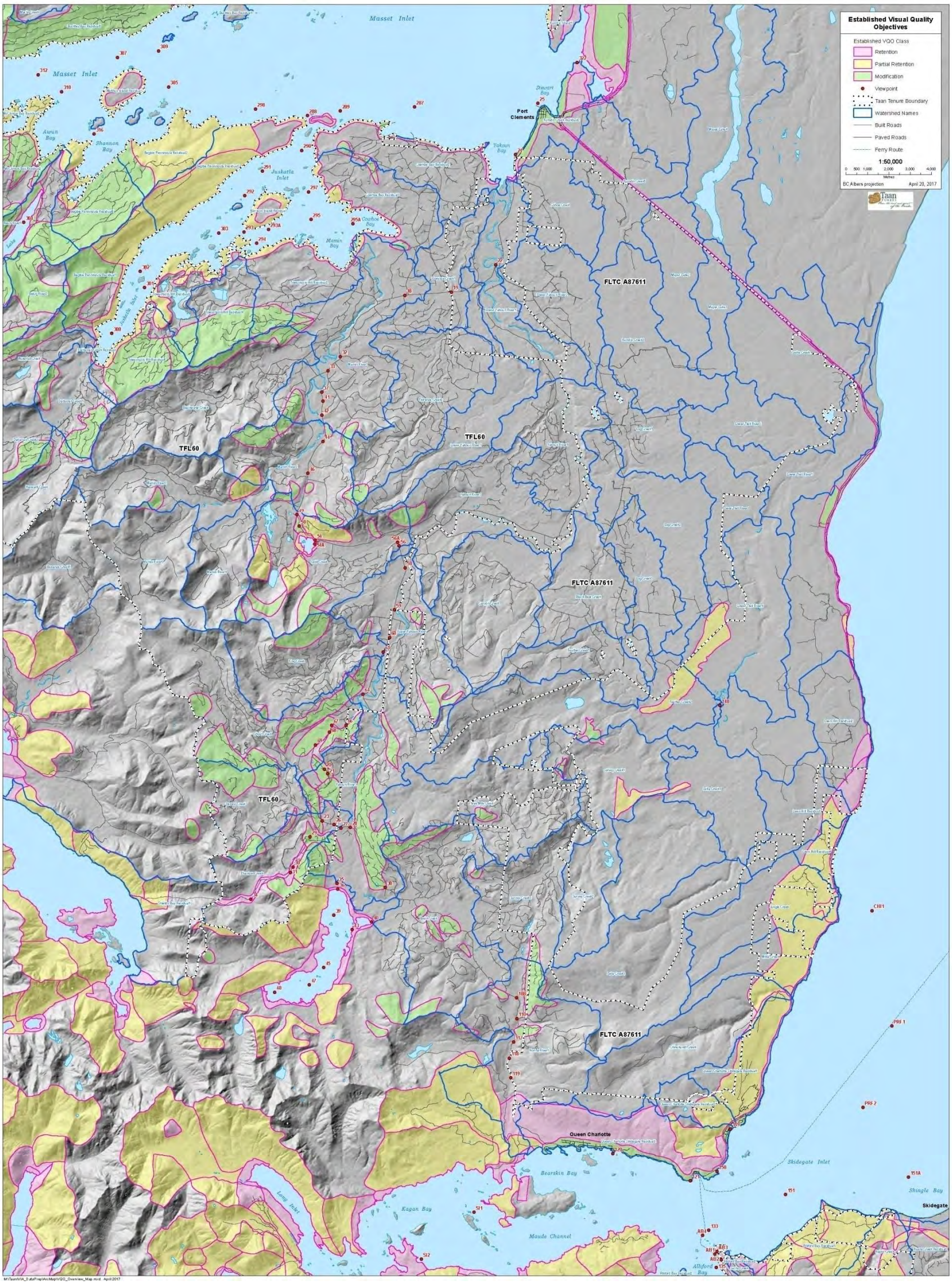
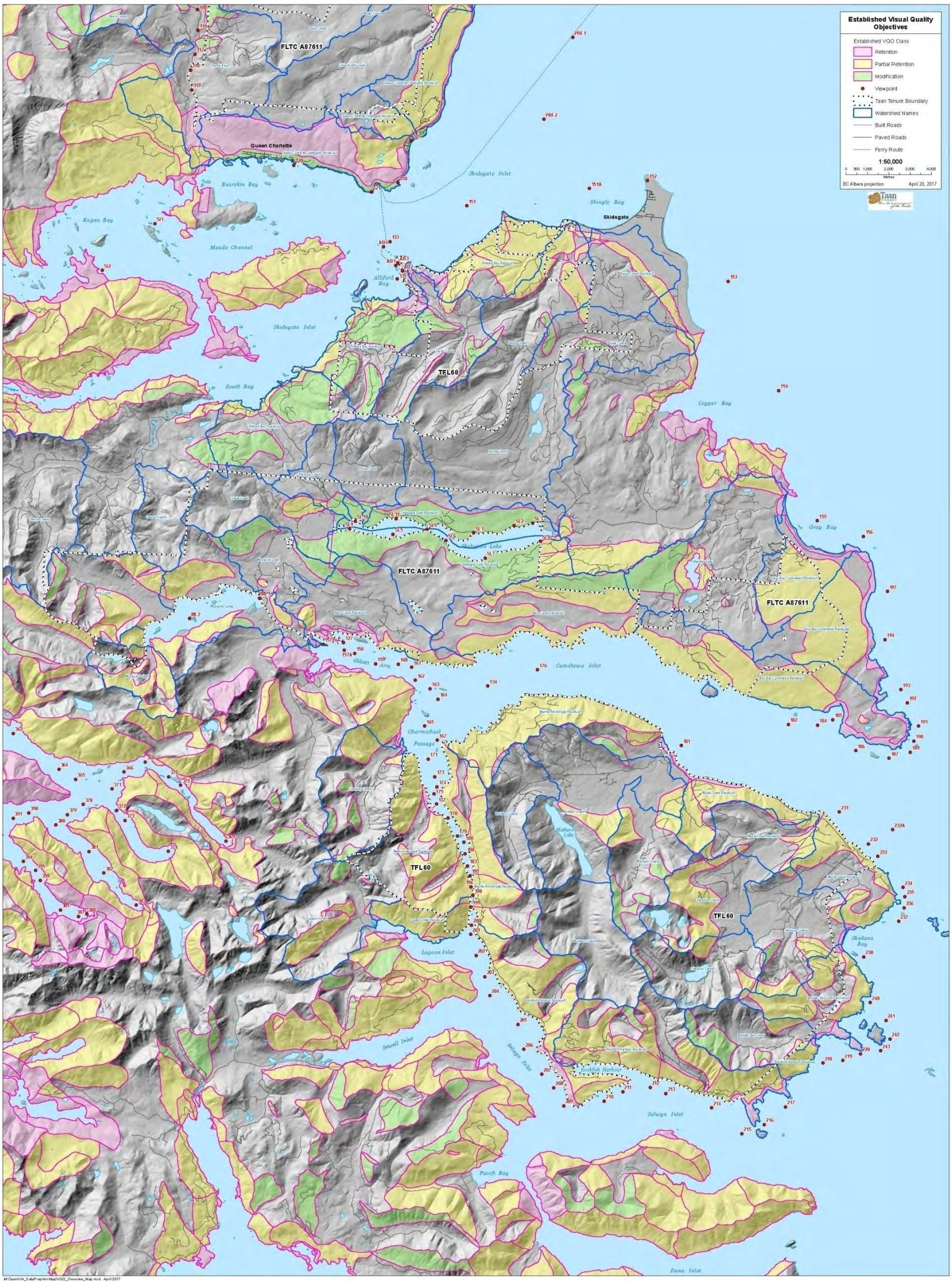


Figure 4: VQO Overview Moresby-Louise compact.



Appendix J: Windthrow Monitoring Form (Sept '16)

Windthrow Monitoring Form

Cutblock ID: _____ **LU:** _____ **Harvest Year:** _____

Completed By: _____ **Date:** _____

Instructions:

Windthrow Monitoring will be completed during block assessments at the following stages (indicate the applicable stage):

- ☐ Post-Harvest Assessment
- ☐ Survival Walkthrough Assessment
- ☐ Stocking Survey

Boundary sections should be reviewed consistent with those initially identified within the Pre-Harvest Windthrow Assessment. A colour copy of the windthrow assessment map should be available while in the field completing this form.Where windthrow is noted above a 20% threshold in a particular boundary section or specific point in the boundary section further detail must be recorded below.

Observed Windthrow

Estimated Windthrow	Boundary Section (from Pre-Harvest Windthrow Assessment) using Falling Corners.											
<10%	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11-20%	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21-50%	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
51-70%	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
>70%	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

For boundary sections or specific areas with >20 % windthrow:

Items Reviewed:	Boundary Sections w/ >20% Windthrow using Falling Corners.											
Boundary Edge or Internal **P**atch												
Distance to windward edge (fetch) - m												
W.T. Penetration (into stand) - m												
Orientation of W.T. - degrees												
LUO Feature Impacted	☐Y ☐N	☐Y ☐N	☐Y ☐N	☐Y ☐N	☐Y ☐N	☐Y ☐N	☐Y ☐N	☐Y ☐N	☐Y ☐N	☐Y ☐N	☐Y ☐N	☐Y ☐N
Topographic Location (**C**rest, **S**addle, **M**id, **L**ower)												
Tree Ht – m (dominant/ co-dom)												
Soil Drainage (L, M, WD)												
Rooting Depth (**S**hallow <0.4m; **M**od 0.4-0.8m; **D**eep <0.8m)												
Stand Structure (**E**ven/**U**neven and **D**ense/ **O**pen)												

Salvage Opportunity: ☐Y ☐N

Attachments: ☐ Map ☐ Photos ☐ Additional Forms (i.e., more boundary sections)

Comments: attach additional pages if needed.

Appendix K: SOP - Planning (Jan '22)

Purpose

Standard Operating Procedures (SOPs) are an integral component of our Corporate Management System (CMS) and provide key controls to ensure that our activities are carried out in compliance with legislative requirements and meet our commitments to ensuring the health and safety of employees and contractors while engaging in sustainable forest management practices.

SOPs are designed to complement Job Safety Breakdowns, quality and technical training, other SOPs and site-specific plans or instructions.

Scope

This SOP provides direction regarding planning and forest management activities carried out by Taan employees and contractors, including the following:

- Planning & Engineering (including salvage planning)
- Forestry & Silviculture

Where conducting services on behalf of a client (e.g., BCTS) that have their own Management System and procedures, the client system is to be used.

SOPs require that each employee perform their duties to the best of their abilities. All personnel and contractors are encouraged to take responsibility to clarify plans or activities if they are uncertain about how to achieve the desired results.

Health and Safety is the first priority. Under no circumstances are SOPs to replace, or come before, safe work practices.

Note: As planning requirements vary, these procedures do not specify the process for planning and forestry, rather they are designed to ensure that on-the-ground field layout is conducted in a way that minimizes impacts to the environment and ensures professional due diligence. This SOP is intended to be a "living" document and will be updated from time to time to address changes to legal requirements as well as changes to corporate commitments (e.g., certification).

The Planning Checklist is an important component of the Planning SOP, as it provides for documentation of the pre-planning considerations and the layout considerations that are considered for each proposed development area.

General Procedures

- A pre-work meeting must be completed prior to starting a Planning & Engineering or Forestry & Silviculture project (initial recce stages are exempt). A project may be a group of blocks within a drainage, a contract, or a specific program such as planting. A Taan Planning Representative must review plans and setting files (including maps, correspondence, checklists, etc.) with the Planning Contractor Representative before forestry and engineering activities begin. Where necessary, a field visit may be required.
- All Pre-works must have an associated worksite safety plan completed by the contractor or if Taan is completing the work by a Taan representative, prior to start up.
- A Taan Planning Representative must ensure up-to-date documents (e.g., SOPs, maps, and plans) are provided to the Planning Contractor Representative. These documents must be made available to layout crews and filed correctly within the Taan file system.

- An understanding of the plan or contract specifications must be completed prior to the commencement of work activities. All activities must be conducted according to the plan or contract.
- Minor modifications to the plan or contract are permitted to address unforeseen circumstances. This should only be done if the environment or the quality of the final product is not significantly impacted.
- If personnel are uncertain about how to perform a task to achieve the desired results, immediate clarification from the supervisor must be received before continuing work. The personnel should perform alternative work until further instructions are received.
- The Taan Planning Representative and field staff must confirm a system for crew check-ins. The system must meet the minimum Taan Common SOP requirements for crew check in. A list of emergency contacts specific to the work area or project must be gathered and the information should be filed within the Taan Check in Procedure Binder, or equivalent. If Planning Contractors are following their own procedures, a copy must be provided to the Taan Planning Representative.
- If an emergency occurs (like a fuel spill, fire, landslide or injury) personnel must take appropriate measures to ensure their personal safety, following site specific emergency response plan and the EPRP SOP. Emergency contacts are located in Appendix 1 of the EPRP.

Supervision & Direct Supervision (Professional)

- For APEGBC members, a member can delegate the completion of professional work to an assisting subordinate member or non-member working under their direct supervision. Direct supervision means taking responsibility for the control and conduct of the work of a subordinate.
- For ABCFP members there must be an ability to undertake the necessary due diligence to assume professional accountability for the "professional forestry" work done by the nonmember under their supervision. The assumption of accountability by the member is based on the personal knowledge of the day-to-day "professional forestry" and job performance of the person being supervised.

Invasive Plants

- The Planning representative and field crew must be aware of known locations of invasive plants (GIS layers) in work areas (refer to the Invasive Plants IAPP Map Display and the Invasive Plants Matrix for known plants on Haida Gwaii filed on the Taan server under Planning/08-Inventories/Invasive Plants).
- Any new sightings are reported to your Taan Supervisor. Ensure that all Plans contain prescriptions that consider invasive plants (where applicable) such as reporting, machine washing and sanitization, etc. Report High Priority species sightings to the Invasive Plants Council.

Data Submissions

- Engineer contractors must post block information throughout the development of the block. Block data is to be submitted at the following stages - Recce – approximate boundary and road location
  - Cultural Feature Identification (CFI) survey completion

- Boundary and road traverse completion
- Stream traversing and riparian work
- Final mapping

- Geodatabase (Geodb) information collected over the development of the block will be submitted to the CHN at least one month prior (via Front Counter) to the RP/CP application and to the Province at the RP Application and again at the CP Application stage. GeoDB updates will be submitted with depletion updates the November after harvesting has commenced.

Pre-Layout High-level Planning – Selection of Area

- Areas will be selected by Taan Course Filter Planning and the contractor will receive a digital or hard copy map of the area; All areas, prior to any field development must be cross referenced by Taan with higher level planning objectives including submitting to the CHN to complete a spatial review to ensure that there are no conflicts with cultural values. The following must be considered and utilized for recce maps and planning maps:
  - Archaeological/cultural features
  - Known and potential karst areas
  - Goshawk territories
  - Saw whet reserves and potential nest sites
  - Marbled murrelet (MAMU) habitats
  - Mushroom habitats
  - Fish habitats
  - Wildlife habitats (known bear dens, raptor nests, heron nests)
  - Rare ecosystems
  - Visual sensitivities
  - Adjacent development areas and Wildlife Tree Reserve Areas (WTRA)
  - Watershed and sub-unit restrictions
  - Known invasive plants
  - Adjacent Forest Reserves, CSAs, Wildlife Habitat Areas (WHA),
  - Adjacent tenures, other licensee developments
  - Utilities, highways
  - SUPs, road permits and forest service roads
  - Permanent sample plots and research plots/areas
  - Mapped reserves (recreation, roads, rock, etc.)
- A pre-layout checklist must be completed ensuring these considerations have been included in the recce map development and have been provided to the Planning Supervisor and Contract Supervisor.

Block Development Procedures

- Prior to conducting field work, a Planning Contractor Representative should consider reviewing the following documents or items:
  - Contract specifications
  - Taan Corporate Management System Documents Operational Plans (i.e., Forest Stewardship Plan (FSP))
  - FSC Management Plans (where applicable)
  - Haida Nation Agreements or Heritage Concerns
  - Public comments
  - Terrain Stability Classification Mapping, if applicable
  - Active Fluvial Unit Mapping and 100 year flood plain mapping
  - Ecosystem mapping and locations of rare (including Red and Blue listed), common and deficit ecosystems
  - Recreation and Visual Objectives, if applicable
  - Biodiversity and Wildlife Issues, if applicable
  - Adjacent property boundaries and tenure holders
  - Invasive plant locations and updated priority list for Haida Gwaii
- All RoadEng Field Notes must be entered digitally. The file name, entry date and person entering the notes must be written on the front of the field notes. Once field notes have been entered, file the field notes in the appropriate file folder. If using handwritten notes, also record the date and initials of the person who entered the field notes.
- All block information will be collected using Taan's templates and data dictionaries, where applicable.
- A Trimble GeoXT or equivalent GPS unit must be utilized to collect locations of, but not limited to:
  - Boundary and road locations
  - Type I, II, and upland stream locations
  - Haida Traditional Heritage features
  - Class 1 Forest Features
  - Yew patches
  - Monumentals and CMTs
  - Other Features requiring accurate mapping and spatial location
- A Handheld or Ipad with GPS and GLONASS capabilities can be utilized to collect locations of:
  - Class 2 Forest Features
  - Yew trees
  - Crab Apple
- Block information will be uploaded and filed accordingly on the Taan file server. All files must be uploaded after data collection and checked for accurateness.
- A Taan Supervisor must be informed when the data is uploaded, including the path to the file locations.

- Files are never deleted from the Taan Server and are only archived using an Archive folder (the only exception is if a file is incorrectly uploaded).
- All folders and files must be adequately named per the File Naming Convention Procedures (see below).
- There are several different stages of block development:
  1) Chance Plan (Recce)
  2) Recce Review
  3) Cultural Feature Identification Survey
  4) Archaeological/Cultural Impact Assessment
  5) Block Layout
  6) Assessments
  7) Site Plan
  8) Post Layout and Final Block Submission

Chance Plan – Recce Area

- Contractors will conduct a field visit to the proposed areas to: estimate block location and size, road location, construction type and length, stand composition, species %, volume and sort types.
- Multiphase contractors will provide Taan with shape file and GPS traverse data of recce'd block shape & roads. The general boundary and road location can be traversed by GPS utilizing a minimum of handheld/ Ipad standards. Recce maps should show general boundary and road location and estimates of streams and types/classification.
- Following recce field work, enter the block information into the Contractor Pro-forma Sheet (Taan Server://Shared/Public engineering/Contractor/Pro-Forma Template)
- Chance Plan/ Recce data is filed under Taan Server://Shared/Public Engineering/Block File and named per the Taan File Naming Convention procedures. Use a sub-folder to separate data (GPS and shape files) from maps (file map directly under Geomatics folder).
- Create the cutblock and required sub-folders on Taan File using the cutblock template provided.

Recce Review

- Taan will review with the Crew Supervisor recce information for conflicts with the Haida Gwaii Land Use Objectives Order (LUOO), Taan objectives, mapping conflicts (WTRAs, other proposed areas, etc.) and general location.
- Taan will review the pro-forma, adjusting costs and values accordingly to current market conditions and harvest bids.
- Taan will confirm with the crew supervisor that the work will carry on or not, based on the proforma, block location, and additional information provided at higher level planning.

Cultural Feature Identification Survey

- A field assessment must be conducted under the direction of a person certified by the Council of the Haida Nation (CHN) to identify Cultural Features Inventory (CFI), prior to commencement of layout, that may be control points for engineering or that may further impact the block's development.
- The Heritage and Natural Resource Department (HNRD) must be notified of the CFI survey by a certified surveyor prior to the survey commencing. A rough shape of the survey area must be provided to HNRD.
- The CFI survey will be conducted in accordance with the CFI Surveyor's accreditation course and the CHN CFI Manual.

- CFI surveys are to be conducted outside the planned block:
  - At a minimum of 150m, ensuring that outside block features are identified to keep the block boundary at a minimum of the reserve/ management zone distance from the features.
  - The CFI area must be extended when there are known Class 1 or 2 Haida Traditional Heritage Features (HTHF) present at a minimum of 1.5 times the reserve and management zone distance of the feature. CFI survey must include the area between the feature and the development area.
- If during recce work or final layout, areas of the block are removed because of Cultural Features, all information needs to be collected and provided to mapping for annual updates to the CHN for these areas as well.
- Monumentals, crab apple and clumps of yew need to be easily identifiable in the field for cruising and logging crews. Refer to the Field Marking procedures (below) for specific requirements related to Monumental Cedar.
- The reporting and mapping need to be completed in accordance with the procedures (note the CFI report requires geospatial data to be produced). Data as a file Geodatabase feature class is also required. The CFI map must include all of the areas surveyed, even if no features were found. A harvest and leave strategy, block alterations and harvesting prescriptions with the Taan Planning Representative need to be developed.
- A package to support the Intergovernmental Process needs to be created, if required, including the information map, photos of any feature to be modified or removed, and the CFI report signed off by a certified surveyor.
- The GPS data for the CFI survey needs to be filed on the Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Geomatics/Data or Shared/Public Engineering/Contractors/CutblockID/Assessments. Mapping needs to be notified of new information placed in this folder.
- The report and associated data needs to be filed on the Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Assessments/HLV & Arch or Shared/Public Engineering/Contractors/CutblockID/Assessments.
- Once the CFI's have been reviewed by an RFT or RPF for accuracy and completeness, they will be submitted to the CHN via email to: CFI@HaidaNation.com.

Archaeological Impact Assessment (AIA)

- All Arch feature locations must be collected utilizing Trimble/ Leica standards
- AIAs are conducted in areas where there are anticipated archaeological features.
- An AIA must be scheduled if one or more of the following are found:
  - CFI surveyor indicates the need for an AIA
  - Where any HTHF or CMT is found– Archeologists will inventory them for recording with the Province of BC archeological site registry
  - <25m elevation or subsurface features are expected
  - Development is planned between at least two archaeological features that are within 100m of each other or documented archaeological evidence in an adjacent area

- AIAs are completed by an Archaeologist or under the direction of an Archaeologist who hold a permit for Archeological work on Haida Tenures including subsurface work and tidal zones.
- Members of the Haida Nation, preferably the CFI crew will be in attendance for all or a portion of the AIA field work.
- An AIA should be completed prior to further block development if:
  - The CFI indicate the requirement of an AIA
  - The development area is <25m above sea level

Chance Find Procedures – Human Remains or Suspected Human Remains

- Work and/ or activities must stop in the immediate area.
- Notify the CHN and local RCMP.
- Do not take photos or touch anything.
- Take precautions to protect the remains (from natural or human impacts) if needed.

Block Layout

- Following review of recce, pro-forma, CFI Survey and applicable AIA, Taan will communicate to the contractor/ Crew Supervisor the next steps as to whether layout may continue, whether any plans need to be adjusted or whether layout should cease.
- Prior to the start of a new project, Taan will complete a Pre-Work Meeting and Pre-Layout Checklist with the Contractor Representative. The Contractor will initiate the completion of the forms found on: Taan Server://Shared/Public/Forms&Checklists including the completion of a worksite and the workplace safety plan. In the event that the contractor has their own forms, they will be provided to Taan and filed with the Pre-layout checklist for each block.
- One Pre-Work may cover several blocks/ areas. However, the Pre-Layout checklist must be completed for each block.
- Pre-Work and Pre-Layout Checklists will be filed under the associated block folder (where one pre-work covers multiple blocks, ensure a copy of the pre-work is filed within each applicable block).
- The Contractor must ensure that they complete Pre-Work meetings with all crew and subcontractors.
- Field layout must adhere to the Field Marking Standards (see below).
- GPS traverse is the preferred method of boundary and road location using a GPS unit required to collect RIC standards (i.e., GeoXT with hurricane antenna). Boundary Traverse with a GPS can follow one of two methods
  1. Dynamic – Preferred method to use by Taan Forest
  2. Static – To be used in situations where Dynamic Traversing is not working
- Determine locations of WTRA's and other reserves. Additional WTRA area should only be added if required LUOO reserves are not representative of the harvest area, otherwise, always use LUOO reserves and management zones for the 7% WTRA , do not exceed 7% unless necessary at a landscape level (refer to layout considerations).
- Collect appraisal data information:
- Road Design
- Culverts

- *Bridges • Stream Class
- Distance to rock (type of rock) Q100
- Reconstruction & Construction Size/ width & length categories *
- **Endhaul & Spoil locations

* Any bridge replacement or placement must have a design and a Cost Estimate Form Completed for Appraisal ** All Endhaul sections must be reviewed and recommended by a terrain specialist. Volumes to remove and distance to spoil sites must be calculated for Appraisal

- GPS traverse roads for reconstruction using the Taan Reconstruction Data Dictionary. Ensure to collect all required reconstruction appraisal data:
  - Case
  - Uphill SS
  - Remaining Road Width
  - Quarry Locations
  - Spoil Site Locations
  - *Removal of vegetation – take pictures
  - ** Resurfacing
  - Culverts
    - Replace/ Install
    - Stream Class
    - Q100
    - Size/ width & length
    - *ditching
    - **Road Widening

* Include regular maintenance and beyond regular maintenance. Take pictures if unsure

** A cost estimate form may have to be completed if claiming for appraisal

- Conduct road inspections from block boundary to log dump (or to last inspected road within the last year) using GPS Road Inspection Data Dictionary.

Block Layout Filing Required

- A Taan Supervisor needs to be informed of new files on the server including a path to the files.
- All raw and corrected GPS data need to be filed here: Taan Server://Shared/Public Engineering/Contractor/CutblockID/Geomatics/Data within appropriate sub-folders of Final Block Boundary, Final Road, Final WTRA, Final Reserve etc.
- All road eng data and road designs need to be filed here: Taan Server://Shared/Public Engineering/Contractor/CutblockID/Engineering/RoadEng within appropriate sub-folders of Final Road XX, Block boundary etc.
- Appraisal data information need to be filed here: Taan Server://Shared/Public Engineering/Contractor/CutblockID/Engineering/AppraisalData (within appropriate subfolders)
- Final block boundary and road locations allow for the development of the cruise map.

- Pro-forma needs to be updated (Taan Server://Shared/Public Engineering/ Contractor/Pro-Forma) and Cutblock Tracking Sheet (Google Docs) with new areas and volume estimates. **Block**

Layout Considerations

Selection Silviculture Systems

- Selection silviculture systems, when utilized, shall maintain or improve stand quality while ensuring that native tree species are maintained at an ecologically appropriate scale, unless an alternative yet sound rationale is provided.

Tree Length

- There are two methods of determining tree height. In any one development area only **one (1)** method may be used. The method used will be recorded in the Site Plan.
    1. Using the site-series the feature is in and then referencing LUOO Schedule 5. As site-series information is required to reference Schedule 5, Plan Holders will need to determine the dominant site-series by field verifying the ecotypes.

       A development area may have several different heights used, depending on feature locations and number of ecotypes. The height/ ecotype used must be noted in field notes/ GPS information
    2. By measuring the tallest tree in the area **adjacent** to the feature. It should be noted that this method would be inappropriate for areas that have been previously harvested (i.e., there are no mature trees to measure). The tree measured must be marked in the field for auditing purposes with the height spray-painted on the tree.
- Where areas have previously been harvested, and the stand has yet to become mature, then method 1 from above must be used

Haida Traditional Heritage Features

- Known features are to be illustrated on the recce map. The feature must be field verified by the CFI crew when a minimum of 1.5 times the reserve and management zones from the planned development. The CFI area must include the distance between the feature and the development area.
- See assessment section and Table 1 for additional requirements. Record and locate the newly discovered HTHFs for inclusion with the CFI report.

Karst Features

- Areas having karst potential are to be identified on the recce map. During layout, monitor for karst features and limestone bedrock.
- Karst features will be mapped and managed in accordance with Table 1.
- Additional assessments may have to be completed by a karst specialist. Newly found karst features must be brought to Taan Planning's attention immediately.

Haida Traditional Forest Features

- HTFFs are to be identified during the CFI assessment.
- Newly discovered features after the CFI surveys are to be managed in accordance with Table 1. Record and locate the newly discovered HTFF for inclusion with the CFI report.

Cedar Retention

• When developing areas requiring cedar retention in accordance with Table 1 consider the following:

- Designate cedar retention requirements within previously required reserve zones, management zones and stand level retention. If insufficient, additional cedar retention areas can be added.
- Each cedar retention area must be >1.0ha in size with a range of yellow and red cedar diameters and composition representative of pre-harvest area.
- Consider trees, snags, stumps and logs >80cm diameter for suitable Black Bear den sites.

Western Yew Retention

• A minimum of 75% of all yew stems within the development area must be retained post harvest.

- Place as many yew stems as possible outside the harvest boundary
- Design roads, boundaries and landings to minimize yew destruction
- Place all yew patches that fall within the harvest area in stand level retention
- Design yew management zones to incorporate as many single stems and patches as possible
- Create larger management zones versus many several small zones
- Design management zones applicable to the harvesting methods
- Maintain overstory cover in management zones including merchantable and nonmerchantable. Tip merchantable timber out where practical, without damaging or destroying yew during falling or yarding
- On steep slopes consider rolling and uncontrolled logs and trees that could impact yew patches, individual stems and management zones
- Appropriately address yew management within Harvesting Instructions

Big Tree Retention

• During pre-layout planning, review the Forest Act Designated Tree Regulations to determine if there are any designated big trees (and their buffer zones) in the vicinity of the proposed development area. All planned development must meet the Act/Regulation.

Special Trees

- A Special Tree Regulation has been released and is in force (Sept. 11, 2020), applicable to crown land, or private land subject for agreement under the Forest Act. Applies to persons conducting primary forest activity (defined in FRPA), including regeneration areas (Free Growing obligations still apply).
- **Specified Tree:** standing tree (live or dead) meeting the species, location and diameter at breast height (DBH or 1.3m) outside bark specified:

Item	Column 1 **Tree**	Column 2 **Location**	Column 3 **Diameter at breast height (cm)**
1	Arbutus	Anywhere	164
2	Cedar, yellow	Anywhere	265
3	Cottonwood, black	In the coastal biogeoclimatic zones	268
4	Cottonwood, black	Outside the coastal biogeoclimatic zones	176
5	Douglas-fir – coastal	Anywhere	270
6	Douglas-fir – interior	Anywhere	160
7	Fir, grand	Anywhere	146
8	Maple, bigleaf	Anywhere	198
9	Oak, garry	Anywhere	136
10	Pine, ponderosa	Anywhere	119
11	Redcedar, western	In the coastal biogeoclimatic zones	385
12	Redcedar, western	Outside the coastal biogeoclimatic zones	290
13	Spruce, Sitka	Anywhere	283
14	Yew, pacific	Anywhere	63

- **Supporting Trees**: all sizes and species of trees within 1ha of a Specified Tree (i.e. 56m horizontal radius).

- **Coastal BEC Zones: MH, CDF, CWH**
- Must not cut, damage or destroy a Specified Tree, or fell, top or destroy a Supporting Tree.
- This includes danger trees – must apply no work zone until, or unless an exemption is granted.
- Tree determined to have been cut if tree is felled, limbed, pruned or otherwise cut (i.e., pruning of Supporting Trees is permitted).
- Exceptions: Supporting Trees may be felled, topped or destroyed for road maintenance or deactivation if modified no more than necessary to carry out the activity (no exemption or reporting needed).
- Exemptions: may apply for exemptions (using form provided by FLNRO). Includes notifications within 30 days after fall, top or destroy a Specified Tree. Some criteria for considering exemptions in the legislation (e.g., necessary for forest management, protection of humans or property, cultural reasons, etc.).

Specified Tree Reporting

- The intent of the regulation is to protect Specified Trees, whether previously identified or not, i.e., automatic protection or simply by their existence they are protected.
- Immediately in force. i.e., if a Specified Tree is discovered during primary forest activity (i.e., includes active road or harvesting ops), a 1ha buffer must be protected and the tree must be reported.
- Once aware of a Specified Tree, it must be reported within 30 days of the tree becoming a Specified Tree or the person becoming aware of the Specified Tree (report to MFLNRO using form provided).

Reporting must be completed even if the Specified Tree is placed within an internal reserve or WTP.

- If the Specified Tree has previously been reported by someone else, a new report is not needed.
- The report details include: harvest authorization permit/ agreement number, date identified, lat/long, species and variety, height and DBH.
- There is no obligation to report a Specified Tree located outside of the area of the primary forest activity that is authorized (e.g., cutblock boundary) but it is encouraged.
- If a Specified Tree outside of the authorized activity area and any portion of the Supporting Tree buffer overlaps the authorized activity area, the Supporting Tree buffer must be protected.

Specified Tree No Longer Standing

- If a Specified Tree is no longer standing, the conditions of the regulation no longer apply (i.e., Specified and Supporting trees are no longer protected).
- Reporting of fallen Specified Trees is encouraged to the District Manager, but not required.

Operations Implementation

- If a large diameter tree is identified in the field but is not noted on the maps, stop activity and report it to the Operations Engineer so that it can be assessed.

Species at Risk

- Wildlife training (Species at risk, locally important species) is provided to Planning personnel through the CMS Level 2 training.
- The following key species are known to exist in Haida Gwaii (as identified in the Land Use Order and within the FSC Management Plan as High Conservation Value):
  - Marbled Murrelet (Bird) – strategies included in the LUOO/ FSP
  - Northern Goshawk (Bird) – strategies included in the LUOO/ FSP
  - Northern Saw-whet Owl (Bird) – strategies included in the LUOO/ FSP
  - Great Blue Heron (Bird) – strategies included in the LUOO/ FSP - Black Bear (Mammal) – strategies included in the LUOO/ FSP
  - Barrow's Goldeneye (Bird)
  - Brown Creeper (Bird)
  - Steller's Jay (Bird)
  - Hairy Woodpecker (Bird)
  - Pine Grosbeak (Bird)
  - Ancient Murrelet (Bird)
  - Long-Eared Myotis (Keen's Myotis) (Mammal)
  - *Fomitopsis officinalis* (Moss)
  - *Oldgrgowth Specklebelly (Fungus)*
  - Haida Gwaii Slug (Mollusc)
  - Sphagnum willfi (Moss)
  - Haida Buttercup (Plant)
  - Red Listed Aleutian Adder's -mouth Orchid, known to occur within the Skowkona Creek Headwaters and Stanley Lake area within the MU.

These key species should be identified on a case by case basis during field work and management

strategies are to be included within the Site Plan, where applicable. The primary objective will be to focus stand level retention for other LUOO considerations within any critical habitat areas for the key species.

- For information on habitat requirements and management strategies, consult the BC Coast Species and Ecosystems of Conservation Concern, species fact sheets.
- For best management practices for raptors, refer to the MOE "Guidelines for Raptor Conservation for Urban and Rural Land Development (2013)". Additional details are also provided in Table 2 below).
- There are also three Important Bird Areas (IBAs) located adjacent to the forest tenures that must be considered during development and planning stages in the area to ensure that the critical habitat and values are not negatively impacted by the operations in the forest tenure areas:
  - IBA 147 - Lawn Point
  - IBA 145 - Skidegate Inlet
  - IBA 144 - Cumshewa Inlet north to Sheldens Bay
- Unique habitat features must also be considered for management, where they are encountered, other than those already addressed under the LUO or FSP such as:
  - Den sites (other than black bear which are addressed under the LUO)
  - Nest sites for birds of prey
  - Ungulate calving sites/ areas
  - Spawning sites for fish
  - Wallows
  - Mineral licks

Migratory Birds

- Migratory birds and their habitat are managed at the landscape (and stand) level through the various reserves and conservancies established as part of the Land Use Order. The LUOO also facilitates high retention of old forest, and maintenance of various seral stages across the landscape, which are two critical components of migratory bird habitat conservation (Migratory Bird Guidelines, Region 5). Cutblock sizes are also generally smaller (on average) under the LUOO.
- Taan also monitors the effectiveness of landscape and stand level biodiversity through it's forest management reporting, which includes considerations of connectivity, snags, coarse woody debris, etc. The Monitoring Report also includes a Species Accounting System, which groups all known species into broad habitat requirements for consideration of applicable management strategies.
- Indication of an active nest include but are not limited to:
  - Seeing a nest with eggs
  - Birds flying up or out just in front of you
  - Birds swooping at you or attacking you
  - Birds dropping down in front of you without flapping their wings Cheeping coming from tree cavities or trees or shrubs Birds flying into tree cavities.
- Taan's engineering and field staff shall attempt to identify migratory birds and their nests during cut block development.

  Where large stick nests are identified, they are retained (as required), whether occupied or not, as

these nests can provide important habitat for all bird species.

- Should any active nest be identified the nest area should be placed within stand level retention.
- During forestry development work, identify areas or features that may support or have a high likelihood of having nesting bird activity. Include identified areas and features in internal or external retention. These areas may include, but are not limited to:
    - Riparian areas including wetland and wetland complexes,
    - Large snags,
    - Deciduous leading areas or individual trees.

Ecosystem Representation

- Areas of predicted or modelled ecosystems in deficit are identified on the recce map. Deficit areas must be confirmed by a Forester.
- Where ecosystem representation candidates that are in deficit in relation to LUOO targets of at least 0.25ha in size, they must be identified and mapped and removed from the harvest area.
- If the ecosystem is not in deficit, then the area can be harvested and incorporated into the adjacent SU but must be noted that it has been harvested for tracking and reporting purposes.

Mosaics

- Where ecosystem representation candidates that are in deficit in relation to LUOO targets are located in mappable mosaics and the representation of the percent mosaic is at least 0.25ha in size, they must be identified and mapped as a separate stratum and removed from the harvest area. Examples:
    - 1.8ha area has 20% of an ecosystem type that is in deficit (1.8ha x 20% = 0.36ha). This mosaic represents more than the minimum stratum size of 0.25ha and therefore must be mapped and recorded for tracking purposes and removed from the harvest area.
    - 1.8ha area has 5% of an ecosystem type that is in deficit (1.8ha x 5% = 0.09ha). This mosaic represents less than the minimum stratum size of 0.25ha and therefore may be incorporated into the adjacent stratum, mapped and recorded for tracking and can be harvested.
- If the ecosystem is not in deficit, then the area can be harvested and incorporated into the adjacent SU but must be noted that it has been harvested for tracking and reporting purposes.

Unique Ecosystems

- The Land Use Order contains requirements for protection of red and blue listed ecosystems that must be considered and protected per the LUOO objectives.
- The FSC Management Plan identifies three unique ecosystems of special concern (identified as High Conservation Value):
    - Sitka Spruce Riparian Forests (typically CWH wh1 07/08)
    - Sitka Spruce-Sea Spray/ Fog Forests (outer coast areas, windswept, CWHvh2 08/09), no areas have been identified within the Taan tenures based on overview mapping, however, they may exist at the site level so must be considered.
    - Limestone Areas

    For the most part, these ecosystems are primarily located in existing protected areas and areas protected under the LUOO (e.g., Type I and II streams), and through FRPA requirements (e.g., karst features).

- Field personnel should become familiar with these ecosystem types and identify/ prescribe appropriate management prescriptions to conserve a component of these key ecosystems in retention areas (addressed in Site Plans).

Red & Blue Listed Ecological Communities

- The HCV Assessment identifies the following red and blue listed ecological communities that are not included within the LUO and therefore require special consideration by Taan and will be addressed within Site Level planning where they are identified:
  - Western red cedar-sitka spruce/ skunk cabbage (Blue listed)
  - Yellow cedar-mt. hemlock/ twisted stalk (Blue listed)
  - Dune wildrye-beach pea (Red listed), coastal sand dunes
  - Sitka willow-pacific willow/ skunk cabbage (Red listed), wetlands

Adjacent Tenure/ Properties/ Parks & Conservancies

- Mineral and trapping tenure holders are consulted at the Management Plan and Forest Stewardship Plan level.
- Other adjacent tenure holders (e.g., forest tenures, water licenses), property boundaries, parks and conservancies and community watersheds must be identified on relevant plans and maps and appropriate prescriptions developed to address potential impacts to their areas (e.g., windthrow).
- Taan Planner will carry out notification and consultation with adjacent property owners, water license holders and community watersheds when operations are proposed near of these areas. Records will be maintained on file.
- Per the FSP, when operations are proposed adjacent to protected areas, appropriate notifications and measures will be implemented (e.g., windthrow considerations). Special consideration must be given to areas within 500m of parks/ conservancies and 100m of forest reserves or cedar stewardship areas (identified has high conservation value).
- Special consideration is also required for proposed development within 100m of adjacent agriculture land reserves (identified as high conservation value) that are being utilized for agriculture production (as removal of the forest cover can impact the adjacent crops). Engagement with adjacent land owner(s) is required to address any concerns.
- TAUP/ Development area cannot include any of these adjacent tenure/ properties/ Parks and Conservancies. To ensure the harvest boundary will not impact any features found in the adjacent areas the CFI inventory still needs to be completed, information collected, features managed for and reporting completed for the adjacent parks/ conservancies (i.e., within 150m of the block boundary unless Type 1 or Type 2 Heritage Features are present then the distance must increase).

Landscape Level Reserves

- In general, no layout is to occur within Protected Areas, Forest Reserves, Northern Goshawk reserves, and Saw-whet Owl reserves.
- Layout should not occur within Cedar Stewardship Areas, unless approved by Taan Planning.

Wildlife Tree Retention Areas

- Consider adjacent WTRAs/ Wildlife Tree Patches prior to layout. The recce map will identify existing WTRAs/ WTPs.
- Minimize development in adjacent WTRAs. Where harvesting or road development must occur through an existing WTRA a FPPR sec 67 exemption, and an Intergovernmental Process is required. An equivalent or better replacement WTRA must be located.
- Ensure WTRAs are established with the minimum requirement of 3.5% for each cutblock, with an annual average of 7% for each cutblock harvested within the year.
- Utilize Land Use Objectives Order (LUOO) reserve zones and management zones to establish WTRAs unless the LUOO reserve zones or management zones are not representative of the harvest area.
- WTRAs should contain timber and habitat representative of the local stand. Exceptions may be made to reserve habitat features or other areas of high value biodiversity features upon consultation with the prescribing Registered Professional Forester (RPF). For example, target retention areas to conserve unique ecosystems (e.g., ancient forest patches, super canopy trees, rare site series and plant communities) and unique ecosystem features (e.g., caves, mistletoe platforms, mineral licks, vernal pools), wildlife features (e.g., dens, nests, ungulate calving sites, wallows, IBAs and migration areas and non-forested ecosystems (e.g., wetlands, grasslands, rock outcrops).
- Ensure that existing WTRA/WTP are not located in any planned areas for future development. If this is not possible, then approval must be obtained from the Taan Planner prior to conducting any layout within any adjacent WTRA/WTP.

Stand Level Reserves

- All reserves and Wildlife Tree Retention Areas (WTRAs) internal to the block boundary must be established in the field.
- Targets for stand level retention are included within the FSC Monitoring Report and include (WTRA and LUO reserves should be used to fulfill these requirements where possible):

- Average cutblock size 23ha
- Average patch size is ≥ 2.0ha (permitting a range of patch sizes across blocks)
- Average stand level retention is 23%
- Average large snags (>30cm dbh) in patch >22 sph
- Average large CWD (>30cm dbh) in patch >32 sph; harvest area >16 sph • Consider placement of stand level reserves to conserve special sites such as:
- Ancient forest patches (at the extreme end of the natural disturbance cycle)
- Vernal pools
- Small wetlands
- Super-canopy trees (large, living trees that tower over the canopy)

- The Skidegate LU has a target to achieve an average of at least 20% stand level retention, as measured on an annual basis (i.e., all blocks harvested in each year).
- Per the Site Plan FSC requirements, field work must include a review and documentation of key stand characteristics for the stand level reserves (e.g., stand type, snags, CWD).
- Consider landscape level connectivity when establishing reserves and retention areas.

Permanent Sample Plots

- The primary objective is to ensure potential PSPs near development areas are identified in the field and managed accordingly.
  - No assumptions are to be made in the field of how to manage the PSP.
  - PSPs must be brought to the Operations Engineer's attention immediately when they are discovered.
  - PSPs will be reviewed by Taan and the Lead Engineer for the block.
- When a PSP is identified from the higher level review, the following procedures must be followed:
  - Use the information from PSP geodatabase to locate the PSP in the field.
  - Attempt to locate the plot by conducting sweeps away from the block boundary. Once greater than 300m from all points of the proposed harvest area, searching may cease.
  - If the plot is found mark the corners, plot center etc. of the PSP with a GPS (Trimble GeoXT, Leicha or better – NOT a hand held Garmin) and provide the location to Taan.
  - Plan for a 300m buffer on the PSP until reviewed with the Taan Planners.
  - Take pictures from the plot center in a North, East, South and West direction.
  - The 300m buffer may be reduced or removed:
    - as indicated by Taan Planners
    - if a portion of the PSP has already been exposed to an opening, the reduction may be to a maximum, the width of the PSP to the opening
  - As spatial information of PSP locations is not accurate, if the PSP cannot be found ensure that there is nothing within 300m of the entire block boundary.
- When a PSP is identified in the field that was not identified by higher level reviews, the following procedures must be followed:
  - Notify Taan Planners immediately upon discovery and provide:
    - Plot identification indicating establishment date, and who established the plot
    - GPS spatial information as above General species of trees within the plot - Plan for a 300m buffer around the plot.
  - The 300m buffer may be reduced or removed:
    - as indicated by Taan Planners
    - if a portion of the PSP has already been exposed to an opening, the reduction may be to a maximum, the width of the PSP to the opening

Road Network Management

- When planning road networks, it is best practice to avoid subsurface and surface drainage interception and/or diversion by roads and trails.
- In general terms, road density for all watersheds should be minimized through planning and implementing harvesting schedules.
- Minimize new road construction and utilize existing roads/ temporary roads/ trails to the best extent possible within the following Landscape Units (LUs):
  - Skidegate
  - Masset

Recreation

- The following recreation areas have been identified as important sites that must be considered when developing areas located near these features:
  - Masset Inlet

- Papa John's Campsite (Yakoun River)
- Mosquito Lake (trails, campsites, rare plants, old growth, viewscapes, etc.)

- Mosquito Lake is an important area to the Haida Nation and the Mount Moresby Adventure Camp (MMAC). If operations are planned in the area, the Haida Nation and the MMAC must be consulted prior to operations to ensure their concerns are met.
- Other recreation areas may be made known through higher level planning and indicated as such in the pre-work. Objectives for the sites must be considered and maintained in accordance with the pre-work.
- Where non-motorized access is a recreation objective and development makes the area "motorized", deactivation needs to be planned to return the site to "non-motorized".

Large Landscape Level Intact Forests

- There is an insignificant amount of large level landscape intact forests located within the Taan tenures (1.8% of the intact forest polygon). Forest management activity in this area will fall within allowable disturbance thresholds (refer to the FSC Management Plan for details). No special management is required.
- However, if Taan operates within other areas in the Timber Supply Area (TSA) that are located within the FSC certified area (outside of the Taan tenure area), then large landscape level forests and established disturbance thresholds must be considered (refer to the FSC Management Plan for details, where applicable).

Green Up/ Adjacency

- FRPA sets out requirements for maximum cutblock size and adjacency (Forest Planning and Practices Regulation section 64 and 65). These requirements are also addressed in the FSP and in the Site Plan.
- FRPA defines "adjacent" as an area that is sufficiently close to a cutblock that, due to its location, could directly impact on, or be impacted by, a forest practice carried out within the cutblock.
- "Sufficiently close" would depend on the issue being considered. For a goshawk nest, 1km may be close; for windthrow, 2 tree-lengths from the timber edge may be close; for visuals, 10km may be close.
- The general "rule" that Taan follows is that the minimum distance between blocks that exceed the maximum cutblock size requirements (e.g., >40ha combined, not greened up, not retention as defined) is 400m. Moreover, 400m is the guideline for determining adjacency. Available research shows that for edge influence and interior forest, there is a need for a minimum of 400m between blocks to avoid having one block affect another.
- The minimum distance between blocks may be reduced to as low as 300m, provided there is sufficient supporting rationale that is approved by Taan Planning. Considerations and rationale include future harvesting opportunities (i.e., ensuring an economical leave patch between blocks) and that one block will not have an affect on the other block in terms of, wind and light.
- It is also important to note that per the definitions of retention in FRPA, the 40% basal area retention does not mean 40% block area retention.

Table 1: Reserve/ Retention Requirements

Description	Reserve Zone	Mgmt. Zone	Comments

Specified Trees	1ha		Trees meeting the specific species and diameter criteria must be protected and a one hectare reserve established to protect the specified tree.
Red Listed Ecological Communities ≥0.25ha	Protect each occurrence. CWHwh1 07, 08 (Upper and Middle floodplain bench)		May alter up to 5% of the community in a development area if required to address road access or safety concerns
Blue Listed Ecological Communities ≥0.25ha	Protect each occurrence. CWHwh1 06, 14, 15; CWHwh2 04; MHwh 03, 05		May alter up to 30% of the community in a development area if required to address road access or safety concerns or an intergovernmental process is completed. May alter up to 30% for any other reason, provided intergovernmental process completed.
Bear Dens	20m	1.0 tree length (avg. width)	Active - being used or will be used for hibernation Nov 15 to May 15 – active den (assessed by qualified individual) – maintain a + 220m no-work zone from the den and show on info map May alter or remove bear den and/ or the Reserve Zone if intergovernmental process is completed, is required to address road access or safety and alteration does not occur during winter hibernation season (November 1-May 15). May alter or remove trees in Management Zone (outside of hibernation season) to accommodate road and bridge requirements where no other practicable option exists, accommodate road maintenance or deactivation, removal of danger trees, brushing and clearing of right of way, for safety, on any existing road under active tenure or to mitigate windthrow. In Management Zone, maintain suitable Cw and Yc, trees for bear den recruitment. Focus Stand Level Retention on snags, stumps and logs >80cm in diameter.
Northern Goshawk Nests	200ha	(Feb 15 to Sept 1)	Spatial Reserves and reserve zones may be reduced, provided an intergovernmental process is completed, the reduction is required for road access and no other practicable option exists or for safety concerns, reduction does not occur during breeding season and there is no net loss to the reserve area 800m restricted activity zone (i.e., no harvesting or road building) from the nest location during breeding season (Feb 15-Sept 1 per IWMS). 900m No truck hauling Feb 15 to Sept 1 1200m No road construction or tree falling Feb 15 to Sept 1 1800m No blasting or repeated aircraft noise Nests must be reported to Gov. & Haida
Northern Goshawk Territory			Consult with Taan representative for any development within 5.2 km of any nest site Design harvest areas to maximize retention, minimize opening size (200m max between significant forested areas, increase Type I and II areas) and avoid sharp angles. Increase edge, maintain snags and merchantable timber where possible. Utilize features within the SOP and wildlife features such as snags as anchor points for retention and development of connectivity and connectivity corridors. Utilize Upland streams to connect retention
Great Blue Heron Nests	≥45ha and min distance 350m from nest	-	150m restricted activity zone from no harvest zone during breeding season (February 15-August 31 per IWMS) unless confirmed by qualified professional to be inactive for three consecutive years. Nests must be reported to Gov. & Haida
Northern Sawwhet Owl Nests	10ha (centered on nest)	-	Maintain a 10ha reserve around nest sites. Nests must be reported to Gov. & Haida

Northern Saw whet Owl Habitat	10 ha		Below 300m elevation, maintain core nesting habitat areas across the landscape with maximum inter-patch spacing of 1400m. Utilize stand level retention. Anchor core nesting habitat with large snags
Important Bird Areas		500m	Consider habitat values associated with the IBA – document within Site Plan

Description	Reserve Zone	Mgmt. Zone	Comments
Keen's Myotis	-	-	Associated with cool, wet forests and karst features. Protect the integrity of the ecosystem and features Timing restrictions for maternity sites May 15-Sep. 30; hibernaculum sites Oct. 1-May 31.
Raptors (not protected under the LUOO)	Eagle (undeveloped area) 200m centred on nest Sharp Shinned Hawk (undeveloped area) 500m active nests	100m timing restriction	Protect all nests (active or not) of Bald Eagle and Peregrine Falcon. For all other raptor species, protect all active nests. Recommended reserve zones may vary depending on the species, rural versus urban locations and ability of the species to "co-exist" but generally is 200m-500m in underdeveloped areas, 100m-200m in rural areas, 1.5 tree lengths or 50m from cliff in urban areas. The recommended buffer zone for timing restrictions is 100m. The following guidelines for timing restrictions during breeding season can be used: -Bald Eagle February 5-August 31 -Peregrine Falcon March 30-July 20 Taan may wish to seek advice from professional biologists in some cases for more site specific BMPs.
Haida Traditional **Heritage Feature - Class 1**	500m	-	To address site specific values the reserve zone may be reduced by 0.5 tree length (no IGP required) provided no net loss of reserve in development area. Record the site-specific value being managed. May reduce area of Reserve Zone provided an intergovernmental process is completed; and the reduction is required for road access or other infrastructure or to address safety concern and no other practicable option exists. Arch Alteration permit may also be required Where area in reserve zone previously altered or harvested, provide for recruitment (through natural processes and management intervention)
Haida Traditional **Heritage Feature - Class 2 and Karst**	100m (avg. width)	-	To address site specific values the reserve zone may be reduced by 0.5 tree length (no IGP required) provided no net loss of reserve in development area. Record the site-specific value being managed. May alter, remove or reduce the feature or Reserve Zone provided an intergovernmental process is completed; and the reduction is required for road access or other infrastructure or to address safety concern and no other practicable option exists. Where area in reserve zone previously altered or harvested, provide for recruitment (through natural processes and management intervention)

Haida Traditional **Forest Feature - Class 1**	1.0 tree length (+/ -0.5 tree length provided no net loss to individual feature)	1.0 tree length	To address site specific values the management zone may be reduced by 0.5 tree length (no IGP required) provided no net loss of management zone in development area. Record the site-specific value being managed. The reserve zone/ management zone may be modified in shape or size in addition to adjacent table provided and adaptive Management plan is in place, and intergovernmental process is completed; and the reduction is required for road access, other infrastructure or to address safety concern and no other practicable option exists. The feature may be altered or removed provide that an intergovernmental process is completed and is required for road access, other infrastructure or to address safety concern and no other practicable option exists.
Haida Traditional **Forest Feature - Class 2**	Provide sufficient stand level retention to maintain integrity for min. 50% of features in development area		Where area in reserve zone previously altered or harvested, provide for recruitment (through natural processes and management intervention)
Hellebore	Maintain 50% of the feature in stand level retention		Where 50% cannot be retained in stand level retention, maintain a minimum of 50% by - Prescribe fall and yard away

Description	Reserve Zone	Mgmt. Zone	Comments
			- Retain non-merch around the feature and - Prescribe machine free zone around feature
cutblock ≥10ha, combined pre-**Cw & Yc** – harvest composition >30%	Min 1ha patch and range of diameters: retain min. 15% of the combined pre-harvest composition		-
Cw & Yc – cutblock ≤10ha, combined preharvest composition >60%			-
Western yew patches (Patch = five or more trees and each tree is within 5m of another yew tree)	Protect all patches with stand level retention (individuals where practicable)		Patches may be altered or removed to accommodate operational requirements for road and bridge construction, where no other practicable option exists.
Western Yew Single stems	Retain a minimum of 75% of all stems		Target majority of yew outside harvest area or in retention. Establish Yew management zones retaining yew, non-merch and some merch. Tip large merch out where possible without damaging yew stems. Design yew management zones based on harvest system – consider rolling logs and uncontrolled logs and cable slicing. Create large zones versus several small zones. Design road, landings and trails to minimize yew destruction.
Protect all **CMTs, Cultural Cedar Stands & Monumental Cedar** >120cm CMT = modified <1920 Monumental = visibly sound Cw/Yc >120cm dbh and 7m log length. Cultural Cedar Stands – 3 or more CMT, monumental cedar or combination, each tree within 50m of another tree	0.5 tree length	1.0 tree length (avg. width)	Cultural Cedar Stands, CMTs and monumental cedar may be altered or removed provided an intergovernmental process is completed; the alteration or removal is required for road access, other infrastructure, or to address a safety concern and no other practicable option exists; and any CMT or monumental cedar harvested will be provided to the Haida. Monumental Cedar not located in cultural cedar stand and 100cm-120cm may be harvested provided that the greater of 10% or 1 monumental cedar is retained within the development area and confirmed through intergovernmental process that the monumental cedar is not required for cultural use or harvesting the monumental cedar is required for road access, other infrastructure, or to address safety concern and the monumental cedar will be made available to the Haida, or other specific measures will be identified. May reduce Reserve Zone provided an intergovernmental process is completed; the alteration or removal is required for road access, other infrastructure, or to address a safety concern and no other practicable option exists; and the integrity of the stand, CMT or monumental cedar maintained. May reduce the Management Zone provided an intergovernmental process is completed, the reduction is necessary to address operational constraints or a safety concern and the integrity of the reserve zone is maintained. Maintain or recruit min. 90% of the management zone as mature/ old

Monumental Cedar – not located in cultural cedar stand and 100cm-120cm	0.5 tree length	1.0 tree length (avg. width)	forest.
Note: reserves and management zones should be as close to even on all sides as possible; average width is only to be used where needed to protect the reserve, such as windthrow protection.			

Riparian Classification & Retention

- Where some or all of the forest within Type 1 or Type 2 habitat and reserve zones or active fluvial management zones and forested swamps are >0.25ha, or northern goshawk nest areas have been previously altered or harvested, provide for recruitment of functional riparian forest through natural processes and voluntary management intervention.

Upland Streams

- Maintain sufficient vegetation to maintain stream bank and channel stability for direct tributaries to Type 1 and Type 2. Where possible, utilize upland streams to create a network of connectivity between retention, reserves and management zones within a development area. FREP monitoring has identified that a 10m reserve or management zone (harvest only the merchantable timber) along small streams can significantly reduce impacts from harvesting.
- Retain non-commercial trees and understory vegetation along streams, lakes and wetlands for protection of riparian functions, to the greatest extent possible.
- Ensure machine free zones are prescribed in site level plans (except for crossings), prescription target is 7m, in order to achieve a minimum of 5m.
- Flag all streams heavily along stream channel (to assist operators). Frequently record stream ID on flagging.
- Retain sufficient amount of trees and understory vegetation to maintain riparian plant communities that are dependent on high humidity micro-climates for upland streams with incised channels and steep gradients.
- Riparian management prescriptions should strive to implement fall and yard away prescriptions wherever possible and limit fall and yard across to situations only where there is no other practicable option. Example: “fall and yard away” or “fall to span and lift away, yard across only where deflection is adequate to ensure the stream bank is not impacted.
- Consider establishing yarding corridors where yarding across streams cannot be avoided.
- Additional classifications include non-classified drainage (NCD) or Fisheries Sensitive Feature (FSF) which is a non-classified drainage but is less than 20% and/ or connected to fish.
- There are no temperature sensitive streams identified on Haida Gwaii.

Non-classified Drainages

Consider adding buffers on flowing or open water non-classified drainages that are connected to streams by prescribing a machine free zone and harvesting only the merchantable timber within 10m.

Fisheries Sensitive Zones

- Fisheries Sensitive Zones (FSZs) are defined as (consistent with the *FPPR*):
  - A littoral zone of a lake;
  - A freshwater area where water is less than 1m deep and does not meet the definition of Type I or II Fish Habitat; or
  - A flooded depression, pond or swamp that is not Type I or II Fish Habitat, stream, wetland or lake, but either perennially or seasonally contains water and is seasonally occupied by fish.
- FSZs will be removed from the harvest area and a 7m machine free zone will be prescribed (to achieve a minimum 5m).

Community Watersheds

- Community watershed areas will be identified on the recce map. Currently only the Honna Watershed is applicable.
- Confirm layout size and timing restrictions as identified within the Community Watershed Assessment completed by Drew Brayshaw of Statlu Environmental Consulting located under Taan Server:\Shared\Planning\08-Inventories\Watersheds\Community Watersheds

Table 2: Riparian Management Areas

Class		Description	LUOO RRZ	LUOO RMZ
Streams	**Type 1 Fish Habitat**	>1.5m width and □ 5%, and fish or potential fish	2.0 tree length (to address site specific values may reduce 0.5 tree lengths, provided no net loss)	-
	Type 2 Fish Habitat	fish or potential fish but not Type 1	1.0 tree length	0.5 tree length (avg. width)
	Upland Stream	Stream reach, not Type 1 or 2	maintain 70% of forests in upland stream areas as hydrologically recovered UNLESS intergovernmental process and watershed assessment completed Retain non-merch and merch where required utilizing stream as connectivity with other retention areas where applicable (Goshawk territories, high retention systems)	
Lakes & Wetlands	**Type 1 Fish Habitat**	>1ha, upstream to Type 1	2.0 tree length	-
	Type 2 Fish Habitat	>1ha, upstream to fish but not Type 1	1.0 tree length	-
	Non-Fish Wetlands/ Lakes		**FPPR RRZ**	**FPPR RMZ**
	W1	>5ha	10	40 (BA Retention 0-100)
	W3	1-5ha	-	30 (BA Retention 0-100)
	W5	≥2 W1 wetlands within 100m; ≥ other wetlands within 60m of	10	40 (BA Retention 0-100)
	L1A	each other ≥1,000ha	-	-
	L1B	5-999ha (or if designated by DM)	10	-
	L3	1-5ha	-	30 (BA Retention 0-100)
	Unclassified	Lake or wetland not classified Type 1 or Type 2	-	-
Estuary & Marine Shorelines	**Type 1 Fish Habitat**	an estuary or marine interface zone connected by a perennial or seasonal stream to Type 1	2.0 tree lengths	-
	Unclassified (i.e., not considered Type 1 Fish Habitat)	estuary or marine interface zone not classified as Type 1 habitat	30m (internal Taan requirement)	-
Active Fluvial Units			-	1.5 tree lengths

Forested Swamps >0.25ha **(i.e., CWHwh1 12 and CWHwh2 06 eco-types)**	-	1.5 tree lengths; ≥70% BA mature and old forest (avg. width) May be reduced to 60% provided sufficient OG retained to maintain integrity and AMP in place

Notes: * Consider increasing the minimum reserve requirements (where applicable) to a minimum of 10m (either uniform distribution or using variable distance approach).

All Type 1 and 2 reach breaks will receive a LUO reserve and/ or management zone "bubble" off the end of the reach break

Record all site specific values where reducing reserves or management zones as allowed above

Type 1: May alter up to 5% of the Reserve Zone for road and bridge construction, or address safety concern and no practical alternative AND integrity is maintained OR can alter up to 5% if intergovernmental process.

Type 2: May alter up to 5% of the reserve zone (no intergovernmental process required); May reduce the management zone by up to 20% (no intergovernmental process required); May also reduce the combined area of the RRZ and RMZ further with intergovernmental process, ensure maintain integrity, develop and implement adaptive management process AND total amount old and mature forest is reduced by no more than 20%.

Upland Stream: Direct tributaries to Type 1 and Type 2 – retain sufficient vegetation to maintain stream bank and channel stability. Incised channels and steep gradients – retain sufficient number of trees and understory vegetation to maintain riparian plant communities that are dependent on high humidity micro-climates.

Active Fluvial Units: May reduce mature and old forest RMZ by up to 10%.
May reduce by additional 10% provided integrity protected and an adaptive management plan is developed and implemented.

Forested Swamps: May reduce mature and old forest to 60% provided that level sufficient to maintain integrity of the forested swamp and an adaptive management plan is developed and implemented. **Average Width:** reserves and management zones should be as close to even on all sides as possible; average width is only to be used where needed to protect the reserve, such as windthrow protection

Sensitive Soils

- Consult inventory information regarding identified sensitive soils (where applicable).
- Identify "Sensitive Soils" on all Plans/ Maps and ensure adequate management prescriptions are developed to ensure minimal soil disturbance in these areas (e.g., timing and weather restrictions, use of puncheon or soil mats, use of low ground pressure equipment, etc.). Where soil nutrient loss is a concern, additional instructions may include use of de-limbing at the stump rather than at the landing, dispersal of slash within the cutblock as opposed to piling, increased retention of understorey vegetation, establishing precautionary soil disturbance limits that are more stringent than those set in FRPA, etc.
- If removing sensitive soil areas from the harvest area, manage for windfall and exposure.

Harvest & Road Planning

- Identify any domestic or irrigation water sources/ intakes within 100m of the planned harvest or road construction areas (consult GIS map layers). Ensure any features are identified on site level maps/ plans.
- Plan road locations to minimize stream crossings and construction of roads/ landings in Riparian Management Areas.
- Consider new road construction and ROW width impacts to ECA and watershed recovery numbers.

- If operations are planned within the RMA, other than crossings, ensure no other options exist, determine the RMA infringement distance and notify the Taan Planning Representative that an RMA infringement rationale will be required.
- When going through Type I and II reserves and management zones consider LUOO allowances permitted (i.e., 5%, 10% limits).
- Plan road locations, landings, backspar trails and skidroads in manner that minimizes disruption of natural drainage patterns (i.e., adequate culverts, minimize road widths).
- Ensure plans/ prescriptions include applicable timing restrictions (e.g., structure installation/ in stream works in accordance with standard Fish Timing Windows stipulated by MoE and DFO. Variances to the standard fish timing windows must have written approval from DFO; wildlife timing restrictions (e.g., winter hibernation, nest sites, etc.)).
- Develop adequate plans to avoid ditch water flowing directly into streams (i.e., install a cross drain ahead of the stream and/ or use ditch blocks).
- Machine free zones must be established on all streams, lakes, wetlands, and marine shorelines with the exception of crossings or other approved infrastructure or restoration of stream channel functions and only if it can be demonstrated that no significant environmental damage will result. Prescribe 7m MFZ, in order to achieve the minimum of 5m in the field.
- Ensure yarding does not disturb stream channels.

Deflection Lines & Equipment Specifications

- Unless otherwise specified within the Plan or Contract, the following parameters should be followed:
- A Deflection Line package is to be completed as part of the final block package:
  - include a deflection line map showing the location of all deflection lines within the grapple setting
  - include a deflection line plot of each deflection line using the specifications listed below
  - the deflection lines can be generated using lidar or roadeng if established in the field
  - place the deflection line package on the server under Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Engineering/Field Notes/D-Lines or Shared/Public Engineering/Contactor/Cutblock ID/Engineering/Field Notes/D-Lines and named per the Taan File Naming Convention procedures.

Table 3 - Deflection Lines & Equipment Specifications

Harvest Method	Tower Height (meter)	Yarding Distance (meter)	Minimum Deflection (%)	Maximum Backspar Height
Swing Yarder	18m	0-150m 150-250m 250+	6% 8% 10%	5m for mobile backspar, otherwise 2m
Ground Based	n/a	150m (favourable) 75m (adverse)	40% (max slope) 25% (max slope)	n/a

Road Running Surfaces & Alignment Controls

- Default road design parameters are summarized as follows:

Table 4 - Road Layout & Design Specifications

Grades		Running Surface & Ditches	
Favourable	**Adverse**	**Width**	**Depth**
Sustained: 18% Short Pitch: 24% Switchback: 15%	Sustained: -12% (-15% if straight) Short Pitch: -15% Switchback: -8%	All roads: 5m Ditches: 0.25m	Surface: 0.25m Ditch: 0.7m

Further guidelines are referenced from Table 2 of the Forest Road Engineering Guidebook (June 2002) (see below).

Table 2. Summary of alignment controls for forest roads.

Stabilized Road Width (m)	Design Speed (km/h)	Minimum Stopping Sight Distance[a] (m)	Minimum Passing Sight Distance for 2-Lane Roads (m)	Minimum Radius of Curve (m)	Suggested Maximum Road Gradient[b,c]				
					Favourable		Adverse		Switchbacks
					S	P[d]	S	P[e]	
4	20	40		15	16%	18% for distance <150 m	9%	12% for distance <100 m	8%
5–6	30	65		35	12%	14% for distance <150 m	8%	10% for distance <100 m	8%
	40	95		65					
8+	50	135	340	100	8%	10% for distance <200m	6%	8% for distance <100m	6%
	60	175	420	140					
	70	220	480	190					
	80	270	560	250					

NOTE: These are suggested alignment controls for average conditions on forest roads. Variations can be expected, depending on, for example, site conditions and time of use.

[a] For two-lane and single-lane one-way roads, multiply the minimum stopping sight distance by 0.5.

[b] There are no absolute rules for establishing maximum road gradient. Maximum grades cannot generally be established without an analysis to determine the most economical grade for the site-specific conditions encountered. The maximum grade selected for design purposes may also depend on other factors such as: topography and environmental considerations; the resistance to erosion of the road surface material and the soil in the adjacent drainage ditches; the life expectancy and standard of road; periods of use (seasonal or all-weather use); and road surfacing material as it relates to traction, types of vehicles and traffic, and traffic volume. Apply other grade restrictions in special situations. For example:

- On horizontal curves sharper than 80 m radius, reduce the adverse maximum grade by 0.5% for every 10 m reduction in radius.
- As required at bridge approaches, and at highway and railway crossings.

[c] S – sustained grade; P – short pitch

[d] Design maximum short-pitch favourable grades so that they are followed or preceded by a section of slack grade. The average grade over this segment of the road should be less than the specified sustained maximum.

[e] Design maximum short-pitch adverse grades as momentum grades.

Culverts & Bridges – Major Structures

- At Taan all bridges 6m and greater in length are designed by a Professional Engineer.
- A wood box culvert can not exceed 6m center of bearing (COB) in length. Structures greater than 6m COB are bridges that require a Professional of Record (POR).
- For Taan the Professional of Record (POR) will be a Professional Engineer and will also be required for the following:
  - A pipe having a diameter 2000mm or greater
  - A pipe arch having a span of 2130mm or greater
  - An open bottom arch having a span of 2130mm or greater
  - Flow rate of $6m^3$/sec or greater

- Every bridge and engineered crossing must have a Professional of Record and a Coordinating Registered Professional (CRP). These roles may be filled by the same, or different professional (ABCFP or APEGBC).
  - Professional of Record – responsible to design the crossing which includes the general arrangement drawing, complete field reviews and prepare as built / record drawings.
  - Coordinating Registered Professional - responsible for planning and coordinating all the professional services for the crossing project (including the design, field reviews, as built/record drawings). The CRP must direct those activities with sufficient oversight and supervision such that they can take overall responsibility and accountability for the crossing.
  - Crossing Assurance Statement – required for all bridges and engineered culverts and must be signed by the POR or the CRP.
- The following roles and responsibilities apply:

Coordinating Registered Professional (CRP):
Plan and coordinate activities relating to the *crossing* project in the context of the overall development, and confirm that the necessary assessments for the project have been completed; Must determine the appropriate location for the *crossing*; Consider applicable professional obligations and governing legislation and ensure that the required approvals, licenses and permits have been obtained; Understand all generally accepted uncertainties inherent in the *crossing* project including assumptions made by the *POR* and/or *specialists*; Oversee and take professional responsibility for all planning and coordinating work; Understand the roles and responsibilities of all the people involved in the planning, *design* and construction of the *crossing* project; Utilize, *specialists* in the *design* and construction of a *crossing* where required; Consider information received and where appropriate provide this information to the *POR* and/or *specialists*; Consider the safety of those who will use the *crossing*; Consider other resources at risk such as, the environment, utilities, water supplies, water quality and quantity, sedimentation, and fish habitat that could potentially be caused by the *crossing*; and Have the *Crossing Assurance Statement* signed by the *POR*/*CRP*.
Professional of Record (POR):
Consider all factors that may impact the proposed crossing; Consider the safety of those who will use the crossing; Consider risks to the environment, utilities, water supplies, water quality and quantity, and fish habitat that could potentially be caused by the crossing; Take professional responsibility for the general arrangement drawings; Communicate to the CRP other impacts of the design, such as changes to the road alignment and environmental concerns; Review design of fabricated components to determine whether they meet the intent of the general arrangement drawings. Undertake sufficient field reviews during construction (and determine their timing and extent) so that the POR can take professional responsibility by confirming that the crossing is safe for the use intended. The responsibility for field reviews does not necessarily mean that the POR must personally conduct all field reviews, but the field reviews must be carried out under their direct supervision such that they can take responsibility and provide a Crossing Assurance Statement. Revise the design, and document the revision, to address changed conditions encountered during construction, Prepare as built/record drawings, Prepare and obtain other relevant field and construction data related to the crossing, and Prepare a Crossing Assurance Statement.

- The responsibility for design and field reviews does not necessarily mean that the POR must personally conduct all design and field reviews, but the POR must see that they are carried out under his/her direct supervision so that he or she can sign and seal the necessary Crossing Assurance Statement.
- The responsibility for determining the nature and extent of field reviews, and who should undertake them, is left to the judgment of the POR. While tasks can be delegated to employees, colleagues and subcontractors the overall responsibility for the crossing remains with the POR. The POR must consider whether to conduct field reviews during the following construction activities:
  - Layout,
  - Foundation,
  - Component assembly, - Erosion control measures, and - Approaches.
- When installing wood box culverts and major culverts refer to the following:
  - Engineering Manual – Appendix 3.5
  - FERIC Log Bridge Construction Handbook (1980)
  - Forest Road Engineering Guidebook (June 2002), Table 8
  - Guidelines for Professional Services in the Forest Sector – Crossings (July 2014)
  - Canadian Highway Bridge Design Code (CAN/CSA S6) and the Canadian Foundation Engineering Manual (as appropriate)
- Flow rates must be calculated using the following documents or items (or equivalent):
  - Taan Riparian Assessment Field Card
  - Hydrologic Flow Calculation Excel Spreadsheet
- A Design Aid is a tool, prepared by a professional engineer which can be used to communicate specific parameters that can be applied to a site specific situations. When using a *design aid* a *POR* should;
  - Obtain authorization from the *professional engineer* responsible for the *design aid* prior to using the *design aid*,
  - Have discussed the *design aid* with the *professional engineer* to ensure that he/she understands the limitations of the *design aid*,
  - Reference the *design aid(s)* in the project documentation,
  - Include copies of the *design aid(s)* with the project documentation, and
  - Seek *specialist* assistance (usually from a *professional engineer*) when applicability of the *design aid* is in question or unforeseen circumstances make the *design aid* not applicable or questionable.
- Refer to the Operations SOP for the design and construction criteria for wood box culverts.

Culverts & Bridges General

- All crossings require a Coordinating Registered Professional (CRP). The CRP is responsible for planning and coordinating all the professional services for the crossing project including the design, field reviews, as built/record drawings and Crossing Assurance Statement. The CRP must direct those activities with sufficient oversight and supervision such that they can take overall responsibility and accountability for the crossing. The CRP may also be the Professional of Record.

- Culverts and bridges must be established in the field at all streams and natural drainages (unless a Ford is prescribed).
- Unless otherwise specified in the Plan or Contract, Q_{100} flow rates for culvert sizing will be used.
- Unless otherwise specified in the Plan or Contract, the following minimum culvert sizes apply:
  - all streams, 600mm (CMP); and
  - non-classified drainages, 500mm (CMP) or 450mm High Density Polyethylene (HDPE). Gravel/ rocky soils or materials must be available/ used (fine sand or silt material is not acceptable).

Avgerage Stream width (m)	Q100 Cross - Sectional Area Calculation (3.0 X Ratio)									
	Average Depth of Stream (m)									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.2					0.30	0.36	0.42	0.48	0.54	0.60
0.3				0.36	0.45	0.54	0.63	0.72	0.81	0.90
0.4			0.36	0.48	0.60	0.72	0.84	0.96	1.08	
0.5		0.30	0.45	0.60	0.75	0.90	1.05		1.35	1.50
0.6		0.36	0.54	0.72	0.90	1.08		1.44	1.62	1.80
0.7		0.42	0.63	0.84	1.05		1.47	1.68	1.89	
0.8		0.48	0.72	0.96		1.44	1.68	1.92		2.40
0.9		0.54	0.81	1.08	1.35	1.62	1.89		2.43	2.70
1.0	0.30	0.60	0.90		1.50	1.80		2.40	2.70	3.00
1.1	0.33	0.66			1.65	1.98	2.31	2.64	2.97	3.30
1.2	0.36	0.72	1.08	1.44	1.80		2.52	2.88	3.24	3.60
1.3	0.39	0.78			1.95	2.34	2.73	3.12	3.51	3.90
1.4	0.42	0.84		1.68		2.52	2.94	3.36	3.78	4.20
1.5	0.45	0.90	1.35	1.80		2.70	3.15	3.60	4.05	4.50
1.6	0.48	0.96	1.44	1.92	2.40	2.88	3.36	3.84	4.32	4.80
1.7	0.51	1.02	1.53		2.55	3.06	3.57	4.08	4.59	5.10
1.8	0.54	1.08		2.16	2.70	3.24	3.78	Pipe Dia	Area (m^2)	Legend
1.9	0.57			2.28	2.85	3.42	3.99	600	0.283	
2.0	0.60		1.80	2.40	3.0	3.60	4.20	800	0.503	
2.1	0.63		1.89	2.52	3.15	3.78	4.41	900	0.636	
2.2	0.66		1.98	2.64	3.30	3.96	4.62	1000	0.785	
2.3	0.69	1.38		2.76	3.45	4.14	4.83	1100	0.95	
2.4	0.72	1.44		2.88	3.60	4.32	5.04	1200	1.131	
2.5	0.75	1.50		3.00	3.75	4.50	5.25	1300	1.327	
2.6	0.78		2.34	3.12	3.90	4.68	5.46	1400	1.539	
2.7	0.81		2.43	3.24	4.05	4.86	5.67	1500	1.767	
2.8	0.84		2.52	3.36	4.20	5.04	5.88	1600	2.011	
2.9	0.87		2.61	3.48	4.35	5.22	6.09	1700	2.27	
3.0	0.90	1.80	2.70	3.60	4.50	5.40	6.30	1800	2.545	

- The equipment used for construction of a bridge, major culvert or stream culvert is situated in a dry stream channel or is operated from the top of the bank except when crossing the stream channel.
- MoE approval is required for any changes in and about a stream that are of a complex nature. Notification may be provided to MoE (i.e., no approval process) for works that don't involve any diversion of water, may be completed within a short time frame and will have minimal environmental impact.
- At least 3 days notice will be given to any persons who are lawfully diverting or using water under the Water Sustainability Act who may be adversely affected by proposed changes in and about a stream (general guideline of within 1km). This notice will be given prior to commencement of the work in and about the stream. An adequate supply of water will be supplied to those affected persons, if required.
- Footings or abutments for bridge structures must be placed outside of the top-of-bank of a stream, unless otherwise approved under a Section 9 Approval under the Water Act.

Fish Streams

- At crossings supporting fish populations, only open bottomed arches, wooden culverts, embedded culverts, or clear span bridge structures will be used. Any other structure would require Section 11 Approval under the Water Sustainability Act.
- Timing of structure installation will be in accordance with DFO Standard Fish Timing Windows stipulated by MoE and DFO as well as the applicable Measures to Avoid Causing Harm to Fish and Fish Habitat as described by the Department of Fisheries and Oceans (DFO). Unless authorized by a Qualified Professional, variances to the standard fish timing windows must have written approval from DFO.
- Where a crossing of a fish stream can be constructed without any in-stream impacts (i.e., no fill placed below the high water mark or increase of the foot print of the high water mark), installation timing will not be limited to the standard fish timing windows.
- Consider having an Environmental Monitor on site during installation or major maintenance projects in the following situations: - Working outside of fisheries windows

- Complex or non-routine installations
- Working in an area noted by the CHN or CHN Fisheries that are fish sensitive

Cross-Drain Culverts

- Unless otherwise specified in the Plan or Contract, the minimal cross-drain size will be 400mm (CMP) or 381mm HDPE.
- Skew culverts to road centerline by 3 degrees for each 1 percent that the road exceeds 3 percent to a maximum of 45 degrees. The minimum slope of the culvert is 2%.
- Unless otherwise specified in a contract, cross drains must be installed every 100m on road exceeding 8%.

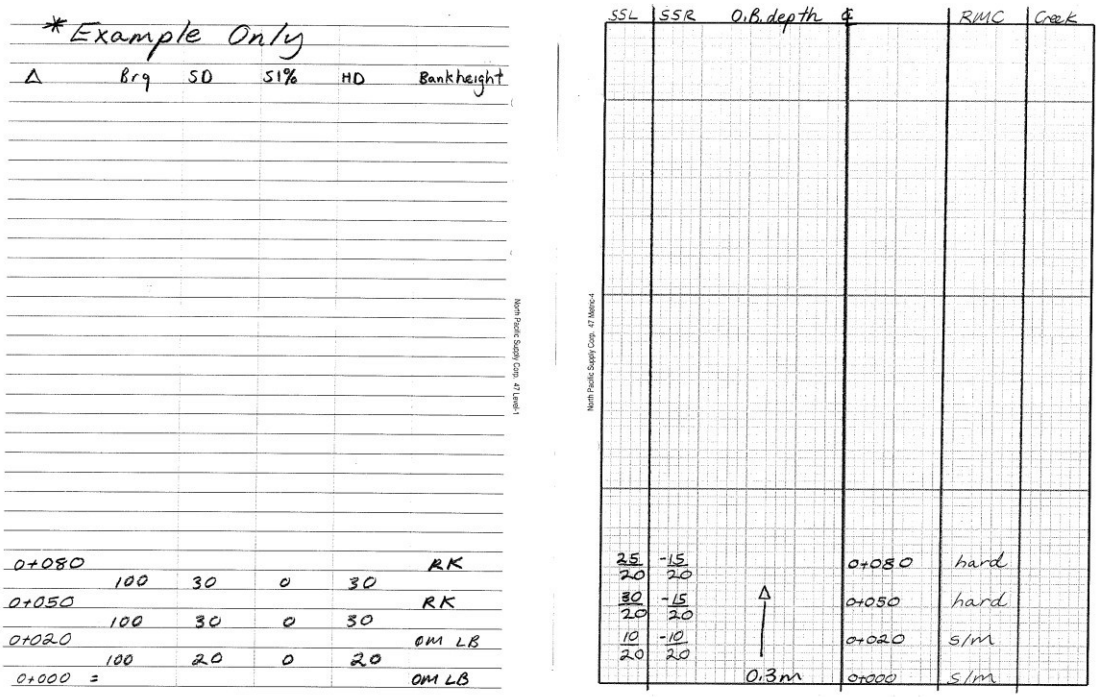
High Density Polyethylene (HDPE) Culverts

- Avoid prescribing HDPE culverts in areas where fine sand or silting material will be used as base bedding and backfill material. A well compact gravel or rocky material (rocks no larger than 8cm) should be available to road crews.
- Prescribed culverts depth must be at least 40 cm; prescribed culvert lengths (where applicable) should be made such that the length of the culvert projecting beyond the road prism embankment is minimized. NOTE: as HDPE culverts are flexible, any length projecting beyond the road prism is susceptible to "bowing upward" (resulting in ditchline water not entering the culvert); prescribed culvert gradients must 2% or less.
- Refer to the Operations SOP for specific installation and maintenance/ inspection instructions regarding the use of HDPE culverts.

Bank Height & Soil Type Guidelines

- Unless otherwise noted in the Plan or Contract, the following parameters must be used to meet the requirements for Road Appraisals.
- Determine whether the ground material is OM (other material that does not require drilling or blasting or RK (Rock/Hardpan that requires drilling and blasting). Put either RK or OM in the appropriate column on your field card (or handheld). If the material is OM use local knowledge and surface indicators of the area to estimate the proper OM category. The three OM categories to choose from are:
  1. (**LB**); ballasted with local material rock or gravel.
  2. (**PR**); pit run gravel that has to be hauled 100 meters or greater.
  3. (**RB**); rock ballast that has to be hauled 100 meters or greater.
- Estimate the RMC (Rock Mass Classification) for both OM and RK sections. The categories to determine in the field are soft/medium or hard rock. If the block (rock size) is greater than 6 inches and very hard to fracture after 3 strikes with the back side of a hatchet it is hard rock. Everything else can be categorized as soft/medium. This info can be collected in a separate column on the field card.
- Depth of OB (Overburden) must be estimated and recorded on your field card. Use local knowledge of the area you are working in and pay attention to cut banks on built roads in the general vicinity to gauge an appropriate value for depth of (OB).

Refer to field card sample for what a bank height method traverse should look like (below):



- The appropriate bank height category for the rock (RK) sections will be calculated using the spreadsheet.
- To complete design stage:
  - In the survey map module of Road Eng set up a Ground Types editor template. Use the categories in the table below.

Table 5 - Bank Height Categories

Bank Height Categories	Cut Slope(%)	Fill Slope (%)
OB – Overburden	200	66.7
RB – OM Rock Ballast	200	100
PR – OM Pit Run	200	66.7
LB – OM Local Ballast	200	66.7
RK – Rock or Hardpan (drill/ blast required)	400	100

  - Enter your material types in the ground column of the survey map module. Enter OB and depth in the layer 1 section. Enter the material type (RK or one of your OM categories) in the layer 2 section. You do not need to enter a depth for layer 2.
- In the location module:
  - Set up your overburden parameters.
  - In the location window click on “edit” select “assign parameters by range”. Once in the parameters window select the “site prep” tab.
  - In the depth from topo section input the greatest OB depth in meters from your traverse.
  - Click on the “outside” tab and select “slope stake” from the drop down list for both left and right side.
  - Make sure you save your file at this point.
  - Now go back to the regular location window.

In the Location module of Road Eng set your data column as follows.

P-Stn m.	Ssl %	Ssr %	Cut V. Cu. m.	Fill V. Cu. m.	Mass H. Cu. m.	Cut Dp. m.	Lyr1 Dp. m.	Lyr2 Dp. m.	Stk L Y m.	Stk R Y m.	Lyr 2 Gnd.
0	18	-10	0	0	0	0.8	0.5	0	1.9	0	RB
0	18	-10	264.2	0	0	0.8	0.5	0	1.9	0	RB
22.3	21	-16	113.5	0	264.2	0.9	0.5	0	2.3	0	RB
31.6	21	-16	14.9	0	377.7	1.1	0.5	0	2.4	0	RK
32.7	21	-16	176.1	0	392.6	1.1	0.5	0	2.4	0	RK
45	26	-16	313.8	0	568.7	1.3	0.5	0	3	0	RK

- It is critical to have these column headers in the proper order to allow the data to be exported in the spreadsheet correctly.
- Copy the data window screen and paste it into the spreadsheet. The spreadsheet formulas will calculate the correct bank height category. Make sure cell A3 is highlighted in the spreadsheet so it pastes in the right spot!! Double check that your column headers are the same as the spreadsheet.

Example of data window imported into bank height spreadsheet.

P-Stn m.	Ssl %	Ssr %	Cut V. Cu. m.	Fill V. Cu. m.	Mass H. Cu. m.	Cut Dp. m.	Lyr1 Dp. m.	Lyr2 Dp. m.	Stk L Y m.	Stk R Y m.	Lyr 2 Gnd.	Bank Height m.	Surfacing D. m.	Bank Height Cat.	RMC
0	18	-10	0	0	0	0.8	0.5	0	2.1	0	RB	1.1	0.5	RB	s/m
0	18	-10	319	0	0	0.8	0.5	0	2.1	0	RB	1.1	0.5	RB	s/m
22.3	21	-16	135.8	0	319	0.9	0.5	0	2.5	0	RB	1.5	0.5	RB	s/m
31.6	21	-16	17.7	0	454.8	1.1	0.5	0	2.6	0	RK	1.6	0.5	MRK	s/m
32.7	21	-16	209.8	0	472.5	1.1	0.5	0	2.6	0	RK	1.6	0.5	MRK	s/m
45	26	-16	374.7	0	682.3	1.3	0.5	0	3.3	0	RK	2.3	0.5	MRK	s/m
69.5	15	-24	125.1	0	1057	0.8	0.5	0	1.9	0	RB	0.9	0.5	RB	s/m
79.5	15	-24	264.5	0	1182	1	0.5	0	2	0	RK	1	0.5	TOE	s/m
95.8	18	-26	429.4	0	1446.5	1.6	0.5	0	3	0	RK	2	0.5	MRK	s/m
122.1	0	-24	58.4	0	1875.9	1.1	0.5	0	1.4	0	RB	0.4	0.5	RB	s/m
127.4	0	-24	379.1	0	1934.3	1.1	0.5	0	1.3	0	RK	0.3	0.5	TOE	s/m
150.3	30	-25	493	0	2313.3	1.4	0.5	0	3.8	0	RK	2.8	0.5	MRK	s/m
174.1	8	-28	196.1	0	2806.3	1.7	0.5	0	2.3	0	RB	1.3	0.5	RB	s/m
183.4	8	-28	353.8	0	3002.4	2	0.5	0	2.5	0	RB	1.5	0.5	RB	s/m
200.1	30	-25	27.3	0	3356.2	1.2	0.5	0	3.5	0	RK	2.5	0.5	MRK	s/m
201.5	30	-25	255.2	0	3383.6	1.2	0.5	0	3.5	0	RK	2.5	0.5	MRK	s/m
211.7	30	-25	292.5	0	3638.8	1.9	0.5	0	4.4	0	RK	3.4	0.5	HRK	s/m
222.3	30	-25	597.2	0.3	3931.3	1.9	0.5	0	4.3	0	RK	3.3	0.5	HRK	s/m
243.8	37	-30	157.8	0.2	4528.2	1.1	0.5	0	4	-0.3	RK	3	0.5	MRK	s/m

250.4	40	-25	275.2	0	4685.8	1.6	0.5	0	4.8	0	RK	3.8	0.5	HRK	s/m
259.3	40	-25	611.1	0	4961	2.1	0.5	0	5.6	0	RK	4.6	0.5	XRK	s/m
287.8	16	-15	134.3	0	5572.1	0.8	0.5	0	1.9	0	RB	0.9	0.5	RB	s/m
298.3	16	-15	0	0	5706.5	0.9	0.5	0	2	0	RB	1	0.5	RB	s/m
298.3	16	-15			5706.5	0.9	0.5	0	2	0	RB	1	0.5	RB	s/m

- Note the appropriate bank height category appears in the Bank Height category column.
- The only data that has to be manually entered into the spreadsheet is the surfacing depth and RMC type.

For reference rock type categories are noted in the spreadsheet.

- Spreadsheet Methodology Explanation:
  - Look in row 1, the ground type reads RB. OM categories are not defined by the height of the cut. RB defaults into the Bank height Category column.
  - Look down to the 4th row, the ground type reads RK. The spreadsheet recognizes that this ground type is defined by the height of the cut. The spreadsheet then calculates bank height category which in this case is MRK (Medium Rock Face Height 1.51 to 3.00m).
  - To calculate the proper bank height category the formula deducts the height of Surfacing Depth from Stk L Y or Stk R Y column.
  - Stk. LY and Stk. RY is the vertical distance from the top of the cut to the subgrade depth minus the overburden depth. The greatest positive value between these two columns is used in the formula.
- Reference Points (RPs) must be established at the following locations:
  - Road junctions
  - Landings
  - Major culverts (field located only)
  - Minimum 200m spacing
- Each RP will contain the following information:
  - Road Name
  - Road Station
  - Stream Number (where applicable)

Road Layout and Design Packages

- Factors to be considered in selecting design and construction standards include: intended road use; vehicle types; traffic volumes; mix of traffic; travel speeds and planned road maintenance and deactivation activities.
- A road package contains the information necessary for a road builder to construct a road to a prescribed standard while maintaining compliance with applicable legislation, minimizing environmental impact and providing for a safe and functional road for future users. An associated “road layout and design” is signed and sealed by a qualified forest professional and submitted to government for approval.
- Minimize the clearing width, while ensuring safety of all road users.
- Road Plans must be signed and sealed as required by the by-laws of the applicable Association by the person preparing the plan and by the Coordinating Registered Professional (CRP) to confirm:
  - The road standard is appropriate for the intended road type, road life and use.
  - The road layout and design has been reviewed by the CRP and is appropriate.

- Specialist assessments or designs have been obtained where needed, and recommendations have been incorporated as appropriate into the design; or recommendations are provided in separate documents and provide suitable direction.

Table 6: Road Layout & Design Package requirements

Description	Detailed Requirements
Road Instructions Map	- See Road Instruction Map requirements below.
Road Profiles	- For all roads - Show topography, finished grade line (with % grade), culverts and cross drains, ground types/layers, side slopes and Mass Haul - Typically 20m horizontal and 2m vertical scale
Road Cross Sections	- For all roads where a side slope exceeds 20% - Typically 1:200 scale - At every traverse and culvert station - Must show soil depth estimate - Must show road prism capping - Construction category 1 – 2 use 1 horizontal 2 vertical cut bank ratio - Construction category 3 – 6 use 1 horizontal 4 vertical cut bank ratio unless otherwise specified by a Terrain Specialist
Plan View	- Switchbacks with >15% favourable grade or > -5% adverse and/or > 2m cut - Critical curves (e.g., for crossing alignment) - Show with stations or hubs, curve radius, BC/EC stations at 1:500 or similar scale
Professional Design/ Drawings	- Major culverts - Bridges - Constructed Fills - Armoured Fords - Additional information may be included as deemed necessary by the operation or at the request of the road builder. Examples may include a copy of road permit approval letter or supporting “text”, “instructions” or summary tables.
Steep Grades Rationale	- Ensure road grades meet those highlighted in the Forest Road Engineering Guidebook 2002 (refer to table 2 (page 27) for road grade specifications). Road grades should not exceed 18% unless no other option exists. If it is necessary to exceed 18% for short pitches (<150m) this should be brought to Taan Forest's attention and a rationale will need to be submitted. Taan Forest may request the road be re-engineered/re-designed to lessen the grade. In the event it is necessary to
	exceed 18% for a distance greater than 150m, rationale is required and a detailed risk/ hazard assessment will need to be completed (OH&S regulations).

• If the coordinating member becomes aware of changed conditions during construction, the coordinating member for construction would either:

- Take responsibility for any changes needed to the road plan. This may involve obtaining input from other members or specialists to re-assess the changed conditions; or
- Contact the coordinating member who prepared the road plan, inform him/her of the changed conditions, and obtain instructions on what changes may be needed to the road plan. In this case,

the original coordinating member would take responsibility for the changes, including preparing an updated road plan.

- It is preferable to contact the original coordinating member who prepared the road plan but this may not always be practical.

Road Maintenance and Deactivation

- Road maintenance and deactivation plans must be completed by or completed under the direct supervision of a forest professional (ABCFP or APEGBC).
- A maintenance plan may consist of general guidelines (i.e. SOP's for activities such as, but not limited to, surface grading and road site brush removal). However, more detailed specific instructions for road sections may be required where there is a significant risk of detrimental effects to the environment or people.
- Consider Haida and public use (including tourism) for the specific area when developing maintenance and deactivation plans, balanced with any need to reduce access to sensitive areas. Work within our sphere of influence to ensure BCTS activity within Taan Tenures also considers these aspects.

Road Works Assurance Statement

- A Road Works Assurance Statement must be completed by the Coordinating Registered Professional (ABCFP or APEGBC) to confirm that the road works (construction or deactivation) were completed in conformance with the plan.
- A coordinating member may delegate field reviews to another individual acting under his/her direct supervision.
- Forest road construction may range from in-block spur roads to major arterial haul roads. The complexity and constructive effort, and consequently the level of field review and construction documentation, will vary accordingly.

Assessments

- The majority of assessments completed by the Contractor will be collected during the Final Block Layout. Where additional assessment work is required, such as that required of specialized professionals the contractor must notify the Taan Planning Representative for approval and to confirm whether any other services are required.
- Assessments are to be completed, signed and filed on the server under the associated block file under "assessments" and folder name of the assessment. Taan Server:// Shared/Public Engineering/Contractor/CutblockID/Assessments.

Streams, Watercourses and Gully assessments

- All streams, watercourses and gullies within and immediately adjacent (i.e., typically within 150m) to planned harvest or road construction areas must be accurately mapped and assessed using the Taan Riparian Assessment Field Card (or equivalent).
- Where prior classification of the stream or watercourse is questioned, a Taan Riparian Assessment Field Card (or equivalent) must be completed (refer to appendices).
- Cards must be retained on file for future reference.
- Where previous assessments have been completed (i.e., by other layout crews), review the assessment to confirm the correct classification of the watercourse. Where the classification is in doubt, reassess

the watercourse using a Taan Riparian Assessment Field Card (or equivalent), located on Taan Server//Shared/Public/Forms & Checklists/Planning.

- A Taan Riparian Assessment Field Card must be used to collect base information when using digital methods for data collection.
- In addition to the Riparian Assessment Card, where gullies are present complete a "Gully Assessment Card" – MFLNRO, or equivalent, located on Taan Server//Shared/Public/Forms & Checklists/Planning.
- Gullies may have to be reviewed by a Terrain Specialist. The Gully Assessment Card must be provided regardless of any recommendations made by the Terrain Specialist.
- Use Fish Trapping (with permit on person) to confirm non-fish streams where the presence of fish may be expected. Fish Trapping may not be used in known fish streams to define the stream as non-fish.
- Fish traps must have the Permit # written on an attached tag.
- A minimum of two traps must be set above the fish barrier. One trap must be set below the barrier as a control.
- If fish are not caught on the first settings, a second setting must be established in a separate season when fish are likely to be present.
- Fish sampling sheets must include:
  - Fish Collection Permit #
  - Stream name with stream characteristics; a Taan Riparian Assessment Field Card (or equivalent) must be filled out
  - Date in, time in and date out of traps
  - Water temperatures
- Summary of trap including number and species of fish caught, if any or a comment that no fish were caught.
- Taan Forest will apply for permits annually at the request by contractors or field staff to complete trapping
- Use Professional Biologists – Fish shocking where fish / non-fish is undetermined.
- Final report includes a brief summary and map highlighting fish, non-fish, stream names, riparian classes gullies and recommended stream or gully prescriptions.

Alluvial Fans

- Alluvial and colluvial fans are located at the bottom of confined channels, and are built from sediment or woody debris deposition in unconfined, lower gradient areas. (MOFR Forest Research Technical Report TR-034, March 2006). To review the report visit: http://www.for.gov.bc.ca/rCO/research/georeports/tr-034.pdf
- Review Alluvial fan mapping completed by Glynnis Horel 2017, orthos, overview maps, and Terrain Stability Maps of the area in order to assess natural landslide processes, fans, etc. in the area of the proposed activity.
- All proposed blocks or road locations within or adjacent to an identified fan must be assessed by a qualified professional. Recommendations resulting from the assessment must be implemented within the site level plans. Identify any areas of special concern noted in the assessment on the appropriate maps.
- If special measures are required (over and above the SOP requirements) or there are areas within the cutblock/road prism that warrant special concern, then prescribe appropriate prescriptions within the Harvest, Road Construction or Deactivation Plans and identify those areas on the maps.

Terrain Stability Assessment

- Generally, terrain stability field assessments are completed when planning activities are proposed within or adjacent (including down-slope) of terrain: - mapped/ rated as moderate or high likelihood of landslides, - mapped/ rated as high or very high erosion potential, or - >60% slopes.
- Regardless of the slope, where there is evidence of potential slope failure (e.g., tension cracks, etc.), ensure the area are communicated to the prescribing RPF and consider consulting a terrain specialist.
- Road construction and harvesting is not permitted on areas with high likelihood of landslide initiation or areas with very high potential for snow avalanche initiation.
- Road construction and harvesting is not permitted unless measures are implemented to reduce risk of landslide or snow avalanche or prevent erosion and sedimentation. Consider also windthrow and proximity to adjacent or downslope values such as fish streams, water intakes, community watersheds, etc. for the following:
  - Areas of moderate likelihood of landslide initiation high or very high landslide induced stream sedimentation hazard, or
  - Areas of moderate likelihood of landslide initiation and high to very high likelihood of the landslide reaching areas of human habitation
- Consider windthrow hazards in areas adjacent to areas with high or moderate likelihood of landslide initiation and prescribe treatment measures, where applicable.
- Terrain assessments are conducted by a Terrain specialist.

Windthrow Assessments

- Windthrow assessments must be completed for every block.
- Use Taan WF Assessment information located on Taan Server//Shared/Public/Forms & Checklists/Planning.
- Final assessment report includes a brief summary report & Map indicating hazards along boundary segments and detailed rationale for Tree Crown Modification or not.

Karst Assessment

- A karst field assessment is required on all blocks with karst features and/ or Limestone with karst potential based on a Resource Inventory Standards Committee (RISC) Karst Inventory Standards and Vulnerability Assessment.
- Assessments are conducted by a qualified specialist or individual trained to conduct karst field assessments.

Hydrologic Assessments

- Hydrologic assessments are completed when planning activities are proposed within or adjacent (including up-slope) of recharge areas for springs for domestic or irrigation water sources.

Visual Assessments

- In the event that the proposed activity is located within a designated scenic area, or other visually sensitive area where visual considerations are desired, visual assessments are to be completed using the FPC Visual Impact Assessment Guidebook and the Visual Landscape Design Training Manual (or equivalent).
- Assessment summaries must clearly identify the Viewpoint ID, the visual quality objective and polygon ID and the planned percent alteration considering all previously harvested and planned cutblocks in the landform (consistent with the recent expectations memo from MFLRNO regarding

visual assessments). Planned alteration must be within the limits (visual objective) for the landform within the designated scenic area.

- Confirm established/ selected viewpoints with the Taan Planner. You may deviate slightly from selected viewpoints if field work identifies any obstructions (e.g., roadside brush). Obtain photographs from the obstructed viewpoint for due diligence.
- Several photographs should be taken from each viewpoint, using different angles and panoramic shots where appropriate. Photographs must capture the entire landform with proposed alterations or if possible, the visible portion of the VLU/ VSU polygon. Number each photograph and record details including:
  - viewpoint number and viewpoint location
  - viewpoint importance (Major/ Minor/ Potential)
  - viewpoint coordinates (Lat./ Long. or UTM inc. elevation (m)
  - viewing distance (Foreground/ Middleground/ Background)
  - viewing duration (High/ Moderate/ Low)
  - focal length of camera lens (mm)
  - direction of view (degrees)
- Provide the files/ information on the Taan Server for the mapping department to generate the DTMs.

Cruise

- A Cruise is completed after the block boundary is confirmed.
- Cruising is completed in accordance with the current version of the Ministry's Cruise Manual (note that these are typically updated several times per year).
- Cruise volume will be used to finalize the Pro-forma.

Stand Level Retention

- Site Plan Foresters are responsible for completing walk through assessments of all planned retention areas and reserves within the TAUP/ Development Area and documenting the required detail within the Site Plan Template under the FSC Considerations. Cruise data may be used to assist with the summary, but it must be supplemented with field walk through information/ comparisons.

Innovative Harvesting Techniques

- Innovative harvesting includes intermediate cuttings of 2nd growth stands. Multiple entrees can occur to extract volume while the stand is still developing. The overall objective is to minimize the footprint of harvesting while extracting merchantable volume from a developing stand over an extended period of time. Management of wind and road placement are key factors with this type of development. Target stands will be aged 40 to 140 years +/- and generally will be of a spruce/ spruce hemlock mix, however cedar stands may be targeted.
- Spruce/ Hemlock stands - Generally 3 re-entries are planned in 10 year +/- intervals removing 10 to 20% of the stand volume depending on external factors and stand attributes (windfirmness, location, stand health). A stand profile of diameters, species and heights will be selected for uniform harvest throughout the standard unit. On the third and final entry the majority of the remaining volume will be removed with anticipated advanced regeneration developed in understorey of site. Planting may have to occur after the final entry to augment natural regeneration

- Cedar – Generally only 2 entrees are planned in 10 year intervals. The first entry will remove 20%+/- of the stand volume depending on external factors and stand attributes (windfirmness, location, stand health). A stand profile of diameters, species and heights will be selected for uniform harvest throughout the standard unit. On the final entry the majority of the remaining volume will be removed. Some advanced regeneration is expected but planting of cedar and even aged stocking standards post harvest will be required.
- The appropriate stocking standard for the standards unit will be noted in the Site Plan by the prescribing Forester.

Forest Influence

- At this time, there are no specific management strategies established to manage for, or to meet any targets for, forest influence. However, as part of the monitoring strategies, Taan cutblocks will be assessed for forest influence to determine the levels that are being achieved through implementation of the LUOO and the portion of cutblocks that currently meet the requirements of a retention silviculture system.
- During the Site Plan process, the forest influence for each cutblock will be calculated as a GIS exercise according to the following interim criteria (based on a review of guidebooks and existing processes in place by other licensees):
  - Forest influence extends into the cutblock from an edge or group of trees for a maximum of 1 tree length.
  - The minimum age of adjacent stands that contribute to forest influence is >50 years old using forest inventory (i.e., adjacent clear cut doesn't get to count).
  - The minimum patch size to be used is 0.25ha (i.e., patch sizes less than 0.25ha do not contribute to forest influence).
  - Use inventory for all adjacent stand ages (in circumstances where field crews report a discrepancy in inventory ages, the field measurements may be used in place of inventory).
  - All edges/ patches that contribute to forest influence have to be established as long term retention (i.e., WTRA and LUOO RZ/MZ but not retention areas unless the Site Plan specifically identifies the retention areas as established for long term retention).
  - Forest Influence is calculated by: all long term retention ha + cut area within 1 tree length of timber edge/ TAUP.

Permanent Access Calculations

- Permanent Access calculations will be completed by Engineering and the Site Plan Forester for every block that contains roads. Information is used to calculate the Net Area to be Reforested and to accurately map road widths for Site Plan Standard Units.
- Permanent Access site degradation calculations will be completed using the Taan Site Degradation Excel Spreadsheet located on Taan Server//Shared/Public/Forms & Checklists/Planning.
- PAS - total road length and side slopes will be required to determine the area of road within the Total Area Under Prescription (TAUP).
- NAR - all roads through the cutblock harvest area are used to calculate the NAR (gross harvest area minus the road area within the cutbock).
- Provide Mapping Department with the road widths for adding to the maps.

  Ensure the estimated Permanent Access Percentage does not exceed 7%. Where the limits are permitted to be exceeded (e.g., safety, topography constraints, off-setting, etc.), ensure the

rationale is consistent with the allowable variances and is documented to file.

Site Plans

- Prior to conducting field work, consider reviewing the following documents or items:
  - Ministry or licensee contract specifications
  - Land Use Order and any drafts in progress
  - Forest Stewardship Plan (FSP)
  - Haida Nation agreements or concerns
  - Public comments
  - Terrain stability classification mapping
  - Active Fluvial Unit Mapping
  - Ecosystem Mapping
  - Recreation and visual objectives
  - Biodiversity and wildlife issues
  - Planning checklist (or equivalent)
- Ensure a Planning Checklist, or equivalent is on file. At the prescribing forester's discretion, a Checklist must be completed prior to Site Plan field work. Site plan field work should occur during the layout stages of block development where the Signing Forester or their designate is part of the layout crew. Otherwise Site Plan Field work should be conducted by the Signing Forester or designate after the layout is complete.
- The Site Plan will be the final field check to ensure all Taan planning processes were followed (including SOPs), assessments completed and layout finalized. The Site Plan cross references the Taan Forest Stewardship Plan, Haida Gwaii Land Use Order, Legislation, FSC Management Plan and Professional Reliance.
- The Taan Site Plan Template and Site Plan Checklist is to be completed for each area. Ensure that the method to obtain tree height is documented within the Site Plan.
- Multiple blocks may be included in one Site Plan depending on the comfort level of the signing Forester. Multiple blocks in one site plans all should have the harvest completion date scheduled for the same year to ensure silviculture obligations have the same timing.
- Site Plans must include a description of the stand structure (including occurrence of live wildlife trees and snags and relative amounts of coarse woody debris), riparian features, rare ecosystems features and/ or other critical habitats identified and basic ecosystem and soil information for both the proposed harvest area as well as internal and external retention patches.
- Coarse Woody Debris Considerations:
  - Studies from Europe, with many generations of intensive logging, show that species of flora and fauna dependent on dead wood are at risk when CWD levels fall below 30% of what occurs in the natural forest. CWD is one of the major inputs of organic matter to forest soils, critical for soil function, structure and productivity".
  - FRPA contains general legal objectives for minimum levels of CWD on the coast (exceptions are permitted for broadcast burn prescriptions or specifications within other agreements/ legal requirements): Minimum of 4 logs/ha, being minimum 5m length and 30cm diameter at one end. This level is very low for coastal forests and most biologists feel inadequate to support natural functions in these forests (Kremsater pers. comm.). A better approach is to assess natural levels of down wood and fall within the typical ranges after harvest and throughout the rotation.

  - Amounts of down wood throughout the rotation are governed by numbers of snags and live trees retained that can provide down wood as the original down wood decays. Hence, retention levels are important.

- In the event that growth and yield or other research plots are identified within or adjacent to proposed cutblocks, refer to the Taan PSP inventory to determine the significance of the plot. All MFLNRO established Growth and Yield Plots must be maintained and any Growth and Yield Plots with Cedar must be maintained. M&B plots of white wood can be harvested.
  If information is not determined on any other established research plot, consult with MFLNRO representatives regarding management strategies to protect the feature (e.g., typically a 100m buffer is considered).
- Calculations done to support the Site Plan development (e.g., cedar retention and regeneration) must be clearly documented and retained on file.
- A peer review is required to be completed by a professional forester and/or a lead engineer involved in the layout harvest area. The final Site Plan will be forwarded to the Taan Planning Supervisor for review.
- Site Plans will also include a silviculture regime/ instructions for Taan's Planning Forester to follow and schedule silviculture activities.
  - Where seed trees or advanced regeneration is utilized, ensure leave trees are selected to maintain species and genetic diversity.
  - Where silvilculture and/ or stand management prescriptions prescribe treatments that vary from 'typical' silviculture treatments, the planner must ensure they are consistent with the Range of Natural Variation (refer to the FSC MP).

A copy of the final signed and sealed Site Plan (with map) and silviculture regime/ instructions (with map) must be retained within the Block File

- Final Site Plan and Silviculture Regime will be filed on Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Forestry/Site Plan and /Treatment Regime or Shared/Public Engineering/Contractors/Forestry.
- During Site Plan Development the Harvest and Road Instructions should be developed. This is to ensure consistency in prescription between each plan. Use the Taan Harvest Instructions and Harvest instructions Template.

Post Layout

- Prior to block completion and data submission, the final layout, road location and engineering of the block must be reviewed and confirmed with the Taan Engineering Supervisor.
- All block information, assessments and site plan must be uploaded to the appropriate files on the Taan Server. Notify Taan Supervisor that all information is uploaded and include a path to the files' location.
- Completion of the Taan Post Layout Checklist indicates to Taan Planning that the block is complete. Any outstanding items must be completed or clarified.
- The post layout checklist serves as the Contractor's final check to ensure all layout requirements are met. This also serves as the "Crew Report".
- Post Layout Checklist is to be signed by the individual completing and the Supervising RPF/RFT and filed with the associated block folder. All related assessments must also be signed by the individual completing and the Supervising RPF/RFT.
- Taan Engineering Supervisors will review final packages for thoroughness and completeness. Once packages are approved by Taan Engineering Supervisors, the block is ready for permit preparation and submission.

Salvage Development Procedures

Post-Harvest Areas

- Salvage areas within the Salvage Contractor's operation Unit identified as "Post-Harvest Areas" must initially be submitted to the Taan Salvage Coordinator for approval. Areas should be identified at a minimum as a block shape using Google Earth or similar ortho photo with a line shape identifying the area at a 1 to 5,000 scale. Indicate on the map:
  - Estimate of area
  - Estimate of volume
  - Estimate of species breakdown
  - Reference points, either Lat's and Long's, UTM or at the least a neighbouring landmark
- The proposed area will be reviewed by the Taan Salvage Coordinator for conflicts with:
  - Land Use Order Higher Level Objectives
  - Taan harvesting or harvest planning – confirmed with Taan Planning Coordinator
  - Additional conflicts previously identified through Taan planning processes
- Provided the proposed area is not in any conflict with higher level planning or with harvest operations the Taan Salvage Coordinator will ensure the contractor:

- Creates 1:5,000 scale or 1:10,000 scale maps "PH Salvage Instructions" depending on the size of the area of approved Post Harvest Areas identifying:
  - salvage boundaries
  - streams, wetlands, lakes and other water courses
  - required buffers, no cutting zones and machine free areas
  - resource features such as WTRA's, Haida Land Values, Arch Features, bear dens, raptor nests, etc
  - known block hazards
  - Instructions relating to timber marking/ approved timber marks, access/ trail rehabilitation (where applicable), protection of existing regeneration, silviculture/ reforestation (where applicable) and cutting permit requirements/ specifications
- File the applicable block information (shape files, maps, etc.) per the Planning & Engineering and Filing procedures (below).

- The Taan Salvage Coordinator will apply to the MOF for the area to fall under the appropriate Post Harvest Salvage Cutting Permit.

- Taan Salvage Coordinator must complete a Pre-work meeting with the Salvage Contractor (ensure the Pre-work meeting checklist is filed).

Damaged Timber Area

- Salvage areas within the Salvage Contractor's operation Unit identified as "Windfall Salvage Areas" must initially be submitted to the Taan Salvage Coordinator for approval. Areas should be identified at a minimum as a block shape using Google Earth or similar ortho photo with a line shape identifying the area at a 1 to 5,000 scale. Indicate on the map:
  - Estimate of area
  - Estimate of volume
  - Estimate of species breakdown
  - Reference points, either Lat's and Long's, UTM or at the least a neighbouring landmark
- The Identified area will be checked by the Taan Salvage Coordinator for conflicts with:
  - Land Use Order Higher Level Objectives
  - Taan harvest planning – confirmed with Taan Planning Coordinator
  - Additional conflicts previously identified through Taan planning processes
- Provided the proposed area is not in any conflict with higher level planning, the Taan Planning Department (which may include planning and forestry contractors that work under the direct supervision of Taan) will conduct required layout, assessments and generate required plans/ maps.
- Block development of Damaged Timber will follow the Taan Block Development Procedures (below).
- Taan Planning Department will complete a Pre-Work and Pre-layout Checklist. There are three types of layout to be identified:
  1. Contiguous areas of salvage <1.0ha
  2. Contiguous areas of salvage >1.0 ha and <3.0ha
  3. Contiguous areas of salvage >3.0ha

Contiguous Area <1.0ha

- Block layout is completed as per the Taan Block Development Procedures "Final Layout" (below).

- Taan ensure that all required permits and authorizations are completed (e.g., road permit road use agreements, scale site authorizations).

  Taan completes necessary SP Amendments and/ or Salvage Plan (to ensure that amendments are completed to the existing Site Plans/ Silviculture Prescriptions if they exist – adjusting WTRA's etc. and to ensure that the proposed salvage harvesting is also covered off by a Site Plan/ Silviculture Prescription or Salvage Plan document). A Salvage Plan is completed using the Site Plan/ Salvage Plan template, completing all sections of the document except for the reforestation/ stocking standards ID section.
- Taan prepares Harvest Instructions outlining general logistics of the operations and a Silviculture Regime (consistent with the Haida Gwaii FSP Retention Stocking Standards).
- Taan reviews and submits the application(s) to the MFLNRO.
- Taan contacts the Salvage Contractor to arrange a pre-work and release the work area.
- Salvage Contractor informs Taan Salvage Coordinator and the MFLNRO office of start-up, timber transportation prior to hauling, and completion of salvage operations.
- Salvage Contractor completes scale of timber and submits to Taan.

Contiguous Area >1.0ha to <3.0ha

- All of the procedures related to Contiguous Area <1.0ha (noted above) apply to areas between 1.0ha and 3.0ha.
- In addition, at the same time the Harvest Plan is developed (step 5 above), Taan completes a signed and sealed Site Plan created by a Registered Professional Forester including all necessary assessments (per the Planning SOP requirements for Block Development and Site Plans).

Contiguous Area >3.0ha

- These opportunities are discouraged due to complexity and cost risk to the Salvage Contractor. Areas more than 3.0ha, are moved from the Salvage Planning program to the Operational planning program and are considered Block Development (procedures below).
- Areas may be competitively bid to include other salvage operators and small scale operators.
- Taan planning contractors complete the block layout as per the Taan Block Development Procedures (below).

Block & Road Naming Conventions

Block Names

- First Three Capital Letters of the watershed name followed by three numbers, sequentially ordered. Final block names to be confirmed by Planning to ensure there are no naming conflicts. For example: - Awun watershed = AWN
  - First block in the watershed = 001
  - Block name = AWN001
- Recce blocks – same rule except followed by _R and two numbers – Example AWN_R01
- Heli blocks will have an "H" added to the end of the block name (i.e., AWN001H)
- Post Harvest block will have a "P" added to the end of the block name (i.e., AWN001P
- Damaged Timber Salvage will have an "S" added to the end of the block name (i.e., AWN001S)

For silviculture treatment blocks (Post Free Growing) the same principles apply as above except use 4 letters and two numbers. The first three letters are the name of the watershed as above The fourth letter is the treatment type in lower case. Then sequential numbering

s = spacing AWNs01 f =
fertilizer: AWNf01 r =
riparian: AWNr01

Road Names

Road Permit Roads

- 5 orders of roads
  - 1 – Main Lines >10km – Full spelling. e.g., Blackwater Main
  - All roads off the main use 4 letters
  - 2- <10k >5k Named based off km leaving Main. First long road off of Blackwater Main at 2 km is Named in 1000s e.g. Blac2000
  - 3 - <5km >1km. Name based off km leaving previous road in 100s e.g., road leaving at 800m = Blac2800
  - 4 - <1km >500m. If possible name based on km leaving previous Rd but likely named sequentially in 10's eg. Blac2810
  - 5 - <500m – Sequentially numbered in 1s e.g., Blac2813

Cutting Permit Roads

- CP roads are block specific and generally short.
- CP road naming convention, use the block name and then sequentially number spurs. For example the first spur in BLA001 =
  - BLA001-1
  - 2nd spur BLA001-2
  - 3rd spur BLA001-3 (secondary spurs off this spur would be BLA001-3A, etc.

Cutting Authority Permits

- Cutting Permits are not submitted to MFLNRO unless a Site Plan has been completed and signed/ sealed by an RPF. For upcoming cedar areas, notify any Haida Representatives that have expressed an interest in bark collection at the time of submission of the permit applications to permit collection of bark prior to harvesting. Typically, bark collection is desired in the spring/ summer months.
- Refer to Appendix 3 for detailed Permit Submission procedures.

Road Inspection & Maintenance Plans

- Forest road inspection and maintenance involves the following activities:
  - road inspections
  - bridge and major culvert inspections
  - road prism maintenance
  - structural maintenance of the subgrade
  - clearing width maintenance
  - ditch and culvert maintenance

Required maintenance activities should be determined from road inspections, road incidents, and

provided by road users including Taan Employees, contractors and the public users.

- The objectives of forest road maintenance are:
  - ensuring user safety
  - Maintaining industrial use
  - minimizing potentially adverse effects to adjacent forest resources
  - maintaining safe fish passage at fish stream crossings - maintaining water quality in community watersheds - protecting the road infrastructure investment.

Road Inspection Tracking

- All roads are kept spatially within Taan's geodatabase for mapping and inventory. Roads are tracked by Road Permit, road sections/ names and level. New roads are added to the geodatabase at time of RP or CP application. The three categories of roads are
  - Main Lines
  - Secondary roads
  - Tertiary roads
- To track and schedule road inspections Taan Forest is using Smartsheets. Roads are taken from the geodatabase as an excel sheet and placed and tracked into Smartsheets. New roads will have to be manually entered once the Smartsheet is created from the geodatabase.
- When a road has been inspected the date of the inspection will be recorded in Smartsheets and a new inspection scheduled. The "Roads" Smartsheet is maintained by the Operations Forester.
- Taan Planning Manager will assign a priority of road inspections for all roads within Taan's active Road Permits and Cutting Permits for Taan Tenures. The assigned priority is outlined in the Taan Road Inventory Smartsheet.
- An inspection plan will be prepared based on inspection priorities assigned to the road section as follows:

Category	Inspection Frequency	Inspection Priority
Level 1	On-going	• Mainline roads that remain active to provide access for all road users.
Level 2	Annual	• Secondary roads that provide access into sub-drainages and development areas
Level 3	Every 2 years	• Tertiary roads that are active but no development plans scheduled.
Level 4	N/A	• Wilderness road – roads that are identified as active, but no further inspection required until development plans has been scheduled for the road section

For roads that have been left active with no maintenance or deactivation completed (i.e. heavy brush / alder roads) by previous tenure holders; these roads will be reviewed in the scheduled road inspection timeline and a maintenance plan, deactivation plan or classification of a level 4 Wilderness Road will be determined. Level 4 – Wilderness Road is an older road that is listed as

active (culverts and or bridges in place) but there is no access possible due brush levels or other road blockages. The risk level is determined to be low and no further inspections are scheduled.

- After extreme weather events, inspections should be carried out as soon as possible on mainlines and first level branch roads. Bridges, major culverts, road structure and safety of the user should be highlighted when completing extreme weather inspections. All staff, should report any road maintenance problems that they encounter during their duties.
- In the event of a significant earthquake (>4.5 magnitude) all mainline bridges and active bridges must be inspected for damage. Active Mainlines with steep slopes should also be checked (i.e., Datlamen Main ~14km)

Road Inspections

- Inspection records should cover key road elements and any deficiencies noted. Where major problems are identified, it is recommended that photographs be taken to accompany the inspection records. The items to be assessed and evaluated when an inspection is carried out include:
  - user safety
  - structural integrity of the road prism and clearing width
  - drainage systems
  - potential for transport of sediment from the road prism
  - road and bridge surfaces
  - priority to complete action
- There are two types of inspections that can be carried out

  1) Informal 2)
  Formal

- Informal inspections are carried out by Taan employees and contractors on a daily basis driving road and being aware of potential road issues. Typically, these inspections do not get recorded however at least once annually informal inspections should be recorded should a formal inspection not get completed. Should an issue be discovered during an informal inspection employees and contractors are required to report the issue to Taan Supervisors immediately. Taan Supervisors will review the issue, develop and prioritize an action plan to resolve the issue.
- Formal Inspections are completed by Taan Employees and/ or contractors assigned specifically to road inspections. The inspection will require the completion of an Inspection form and digital capture of inspection issues.
- When the road has not been inspected previously by Taan, the road and road features will be collected using a Trimble GPS with a road data dictionary.
  - Collect road center line using the road line feature in the data dictionary to spatially capture road location and length
  - Collect road features, bridges, culverts using road point features. Record bridge and culvert information
  - Collect road or road feature issues using road point or road line feature.

  Indicate issue with road or road feature and assign a priority for maintenance on completion of initial inspections, the digital data and Inspection form is forwarded to the Operations Forester. The Inspection forms and raw digital data are filed under an appropriate calendar year here: Z:\Shared\Corporate\04-Audits, Inspections, Incidents & Investigations\05Inspections-Internal\Road Inspections. The digital data is also forwarded to Mapping for processing and preparing a

maintenance map of the inspection.

- Once the initial inspection is complete sequential inspections of roads can be completed using an ipad or similar device with the georeferenced map created from the first inspections. During sequential inspections previous maintenance items recorded should be checked to confirm they have been completed, or as a follow up to ensure issues have not become worse. New maintenance items can be collected. An inspection form is completed for the inspection. The inspection form and new data is filed under an appropriate year here: Z:\Shared\Corporate\04-Audits, Inspections, Incidents & Investigations\05-InspectionsInternal\Road Inspections. The digital data is also forwarded to Mapping for processing and preparing a maintenance map of the inspection.
- The Maintenance maps will be used to development a remediation plan for the action items within the road inspections. Inspection reports and maintenance records will be retained. Under direction of the Operations Forester the Roads Smartsheet with inspection dates will be updated and set the next scheduled inspection confirmed.
- Maintenance items and maps will be forwarded to the Planning Manager for Action Item tracking by road and for operations to complete.
- These Road Inspection Procedures do not supersede the inspection procedures used by Planning when re-activating a road for a block's development (as stated above).
- All roads under Road Permit and those that have an environmental issue noted (even if not under permit) are to be inspected.
- All haul roads and primary road systems (Main Lines) used by the public are to be inspected annually and are covered by the Planning SOP re-activation procedures. Additionally, annual bridge inspections are also conducted on main lines and haul roads.
- Secondary and tertiary roads under Road Permit that are not used as haul roads or public access roads are expected to be inspected every three years.
- While a formal inspection is not scheduled for individual roads this road inspection procedure is intended to cover all secondary and tertiary non-haul roads through general day to day travel to and from the work site. The intent is to have all roads travelled within three years. All roads should be reviewed while traveling to and from the work site.

Conducting the Inspection

- Road inspections are to be conducted by all Planning Contractors, Taan Planning and Operational employees that travel the road systems for work on a regular basis and/or have a general understanding of road conditions for safety and environmental impacts.
- A General overview of the road will be conducted during normal travel on the road (driving, walking to a block, qrading, etc.). The inspector should be watching for road problems relating to Safety and the Environment. Inspection of individual culverts, crossings and other road features is not required unless a problem is noted.

Some issues or problems the inspector may find:

- Tension cracks	- Damaged bridges	- Downed trees	- Missing signage
- Slides, slumps and rocks	- Wash outs	- Failed or plugged culverts	- Impassible road

The inspector should keep in mind priorities for determining action plans:

High Priority	Public/ worker danger or environmental damage could occur at any time
Moderate Priority	Road safety is a general concern but unlikely to be traveled by the public and/ or environmental damage is possible however no evident damage has occurred to date
Low Priority	No safety hazard or very low likelihood of an incident and/ or environmental damage, possible but unlikely – i.e., possible action if a machine is nearby

- Any issues or problems found should be documented by taking a picture of the issue/ problem and recording the road name and general issue with the road.

Recording the Inspection

- When back at the office mark on the Road Inspection Wall Maps what roads you were on. Highlight the road(s) in yellow. If there was a problem with the road mark the road or section of road it in red on the map.
- Roads without any issues are dated on map and initialed by inspector.

Tracking Problem Roads

- Roads with issues have an action plan created. Record and plan an action on the associated Road Inspection Form. Assign responsibility to the action and ensure the person you assigned the responsibility to is aware of the issue.
- If machinery is planned to go to a problem road, there is a good chance the road will be further reviewed for deactivation, in order to remove it from Road Permit.

  Monthly the Road Inspection form has all actions recorded in the Action tracker by Taan's Admin Assistant.

Forestry Planning Procedures

Grass Seeding

- Engage in regular communication with operations regarding scheduling of grass seeding activities for new road construction, new bridge and culvert installations, road reconstruction or road deactivation activities that result in exposed mineral soils that are susceptible to erosion.
- Ensure we order native seed sources with minimal invasive plant content.

Windthrow Monitoring Assessments

- Taan has developed a Windthrow Effectiveness Monitoring Program within the Corporate Management System (Planning SOP) that utilizes a CMS Monitoring Form that collects information for each cutblock at the following stages:
  - Post-Harvest Assessment (within 3-6 months of harvest);

- Survival Walkthrough (typically 1-2 yrs post-harvest); and - Stocking Survey (typically 3-6 yrs post-harvest).

- Results will be compiled and assessed for overall effectiveness evaluation during the compilation of the annual FSC Monitoring Report.

Post -Harvest Assessments

- A Taan representative may conduct Post Harvest Assessment on cutblocks where harvesting has been completed to assess the following and prevent loss of productive forest area (assessment is documented using notes to file or checklist format, where it exists):
  - PAS / ABR
  - Soil Disturbance levels within limits
  - Fire Hazard Abatement
  - Plantability (and whether site preparation is required – piling or re-distribution of slash)
  - Windthrow levels
  - Areas that may require grass seeding to minimize erosion
  - Confirm start of CP falling and completion of primary logging for RESULTS reporting
- Where site preparation, creek cleaning or deactivation is required, create an action plan/ prescription to instruct activities and ensure control measures are in place for sedimentation.

Soil Rehabilitation Prescriptions

- Temporary access structures and unplanned soil disturbance in excess of permitted levels based on soil sensitivity (refer to the Site Plan) must be rehabilitated within five years of disturbance.
- Where permanent access levels are significantly higher than the 7% limit, consider rehabilitation of roads not required for future access.

Creek Cleaning Prescriptions

- All woody debris removed from the creek must be placed 5 m from the high water mark to avoid reintroduction into the creek.
- Scatter woody debris to make plantable spots.
- For mechanical creek cleaning, refer also to the Operations SOP.

Site Preparation Prescriptions

- For Mechanical Site Preparation with ground based machinery, refer to the Operations SOP.
- Ensure the method of mechanical site preparation takes into consideration and balances the effectiveness of achieving management objectives while minimizing negative environmental impacts (e.g., soil degradation).
- Where regeneration and fire hazard are not significant concerns, avoid piling and burning within cutblocks or along roadsides or at landings in order to maintain coarse woody debris, particularly in second growth blocks.

Fertilizers

The use of fertilizers is minimized or avoided.
When fertilizers are used:

- Measures are employed to avoid contamination of surface and ground waters, protect nontimber forest values and maintain long-term soil health (e.g., maintenance of soil organic matter, pH balance).
- Buffer zones are also used to protect rare plant communities, riparian zones, watercourses and water bodies.
- Records are maintained to document fertilizer types, application rates, treatment areas and frequencies.
- A record of the composition of any fertilizers planned for use must be reviewed (and filed) to verify conformance with FSC Principles.
- In the event that damage is environmental values results from fertilizer use, the damage is mitigated or repaired.

Fuel Hazard Assessments and Abatement Procedures

- Fuel hazard assessments are required to ensure that fire hazards created or increased by the harvest activities are identified. As a result of the assessment, the development of a fuel hazard abatement strategy may be required to reduce the fire hazard risk to an acceptable level.
- Assessments can be completed by Taan Staff and Contractors. Abatement strategies must be developed or reviewed by a Forest Professional (e.g., RPF or RFT).

Assessments

- A high level analysis is completed on an annual basis to determine if blocks will require a site level fuel hazard assessment. The analysis includes all blocks planned for harvesting during the upcoming fire season and ones that are harvested and are not declared "regenerated".
- The analysis is completed using the following methodology:
  1. A spatial review is completed by Planning using the "British Columbia Fire Risk Map". Any blocks listed as high or severe require a site level fuel hazard assessment.
  2. Blocks are further evaluated based on the species composition of the harvest area (cedar component) and the ease of public access (refer to Table 7). Any blocks determined in the matrix to be moderate or high require a site level fuel hazard assessment.

Table 7: Fire Hazard Risk Matrix

Cedar Composition	Public Access		
	<200m of Highway or Mainline	**Other roads (flat and smooth)**	**Roads with difficult access (or deactivated)**
> 40%	HIGH	MODERATE	LOW
< 40%	MODERATE	LOW	LOW

- Appendix 4 lists the results of the annual analysis. Where a site level fuel hazard assessment is required (risk map results in high/ severe or risk matrix results in moderate/ high) page 2 of the CMS Post-Harvest Checklist must be completed.

Abatement

- Where the fuel hazard assessment indicates that abatement is required, the following hazard

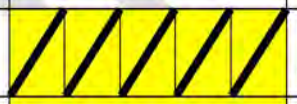
abatement strategies are acceptable to Taan in combination or individually:

- Burning road side piles and or in-block piles. All burning must be completed in accordance with the regulations (such as Open Burning Smoke Regulations).

Non-Abatement options include but are not limited to: limiting public access (e.g., gating or deactivating road) or dispersing vertical and elevated fuels. These options must be reviewed by a Forest Professional.

Field Marking Standards

Harvesting & Road Construction

Item	Ribbon Color	Additional Marking
Falling Boundary (R/W, RRZ, WTRA, Yew Patch, etc.)	FALLING BOUNDARY	Falling Corners every 100m, at significant changes in direction and where roads/ streams enter/ exit block Boundary marked with **orange paint**. FC consecutive numbers, permanent marker with block # and FC # Retention trees marked with 3 dots at breast height and 1 dot at stump (orange paint)
Management Zone (Special, RMZ, Yew Patch)		
Road Centerline (CL)/ Landing location on CL	ROAD LOCATION or CENTER LINE	**Pink paint** on Hub or Station and Reference Points Roads "station, chainage, and road name" hand written on ribbon. "Landing" hand written on ribbon Culverts marked with "chainage station, culvert size and length and stream ID" on ribbon
Road Recce		
Hoe Trail	CENTER LINE	
Deflection Lines/ Baseline		
Non-Fish Stream Centerline		
Fish Stream Centerline		
Machine Free Zone	MACHINE FREE ZONE	
Traverse Station		
Individual Yew Tree		Individual trees marked outside of reserve or management zone patches.
Culturally Modified Tree, Monumental Cedar	CMT,CHN or MONUMENTAL	CFI Yellow flagging is not pre-printed with text, but often marked with felt pen. Monumental Cedar: - Each tree must be marked with the monumental tree number and diameter using orange paint, marked at DBH - Write the MT number and DBH on the flagging Use the following monumental numbering standard: MT1D - the 'D' is first initial of surveyor MQ1D - these are blown down monumentals (monumental quality)

		HK1D - this is for Haaksda Trees - the MT number will need to be carved into the butt of the monumental after it is felled and therefore it is important to limit the amount of numbers and letters - use MT1D and not MT01D or MT001D etc - Trees that were reviewed for MT`s and were discovered not to be MTs should be marked with an X`` at DBH to show they were reviewed - if the tree falls within the block and planned for harvest in addition to paint, attach an aluminum tag to the tree (using aluminum nail) below the point of germination, preferably between the roots or root flares as close to the North side of the tree as possible. Write the block number and monumental tree number on the tag

Item	Ribbon Color	Additional Marking
Class 1 or 2 Haida Traditional Forest Features	CHN	<u>CFI Yellow flagging is not pre-printed with text, but often marked with felt pen.</u> - At a minimum must have CFI Feature type and feature number <u>Flagging Placement:</u> - Banner flag must be hung in the center of patch features at all times - Patch features must be flagged around the perimeter of the patch with feature number (geographic coordinate must be taken from center of patch) - Perimeter flagging not required if within known reserve or no-harvest delineation or where detailed field delineation (for communication with harvesting crews) is not necessary.
Timber Cruise Strip Lines		Plot centers marked with Blue & White Ribbon and Metal Tag or blazed reference tree
Timber Cruise Plot Center		
Treatment Area Boundary		
Safety Hazard	NO WORK ZONE	

Forestry/ Silviculture

Item	Ribbon Color	Additional Marking
Silviculture Surveys & Quality Plots		Plot Centers and start of strip lines
Planting, Site Prep, Fertilization, Spacing or Pruning Boundary		
Riparian Cat Face Treatment		
Riparian/ Silviculture Leave Trees		

Riparian girdling treatment	(white)	

Road Maintenance, Deactivation and Rehabilitation

Item	Ribbon Color	Additional Marking
Clean Ditchline Section		**Paint pink** line at the ditchline and mark arrows indicating direction to clean. Use pink glo ribbon to mark section to clean at POC and POT.
Clean, Remove or Install Culvert	**CULVERT**	Supplemented with hand written instructions
Install Cross Ditch / Install Waterbar	**CROSS DITCH**	Refer to map to distinguish between waterbar and cross ditch
Sidecast Pull-Back	**PULL BACK**	Mark ribbon with start and end stations

Miscellaneous

Item	Ribbon Color	Additional Marking
Tenure Lines	**LEGAL BOUNDARY**	Single blaze or tag (white) at breast height, inter visable along boundaries. Mark corner posts with tenure #
Access Trails (i.e., safe access routes, etc.)	**TRAIL**	Marked on issue map as required.
Helicopter Harvesting – 'Take' Log	-	**PINK paint** for Quality Control purposes after Falling activities occur.
Helicopter Harvesting – 'Leave' Log	-	**BLUE paint** for Quality Control purposes after Falling activities occur.
Dangerous Tree	**KILLER TREE**	**Orage w Killer Tree writing and skull**
Wildlife Tree	**WILDLIFE TREE**	**Yellow w Wildlife tree writing** Also used to mark Big Trees or Specified Trees

- Unless otherwise specified in the plan or contract, field marking standards above are to be used (intended to be consistent with BCTS requirements). Salvage operations may be exempt from full field marking requirements, with written approval from the Salvage Coordinator.
- Layout must be completed to the specifications of the plan or contract. During layout, specific attention must be paid to the following contract or plan items:
  - Machine or equipment specifications (yarder height, yarding distance and deflection)
  - Road design parameters (running surface, minimum and maximum grades and switch back radii)
- Flags or markings are to be located at intervals that are clearly visible; winter weight is to be used.
- Ribbons must be facing inside the block; Falling corners must be clearly identifiable and consecutively numbered; and Falling line is the "harvest area" – not necessarily back lines.

GPS Survey Standards

Trimble/ Leica

- Field traverses are required to be completed using a Global Positioning system (GPS). GPS units with the capability of being adjusted to meet RIC (Resources Inventory Committee) standards (i.e., Trimble or Lieca) are to be used.
- Surveys completed using a GPS must meet the "British Columbia Standards, Specifications and Guidelines for Resource Surveys Using Global Positioning System (GPS) Technology" http://www.for.gov.bc.ca/dkm/ESF_Info/GPS_Standards_Resource_Surveys.pdf.
- Utilize Taan provided data dictionary for collecting data.
- For Boundary traverses use either Dynamic or Static Collection:
  - Dynamic – preferred method
    - POC & POT are considered highly significant points - collect the lesser of 150 epochs or 3:00 min epoch collection at 1 second intervals.
    - POC's and POT's include the beginning and end of spur roads and beginning and end of traverses.
    - Falling Corners and key points/ features along the dynamic line (e.g., LUO features, stream boundary crossings, road/ boundary crossings) are considered standard points with line reference - collect at least 50 epochs at 1 second intervals.
    - Between highly significant and standard points collect epochs using a Dynamic line feature collecting one epoch every 1 second. No more than 10m should be travelled without an epoch collected
  - Static – To be used where a Dynamic function is not operable
    - All Falling Corners, POC's and POT's of roads/ streams etc are considered highly significant points as there is no reference (line) to tie the point to - collect the lesser of 150 epochs or 3:00 min epoch collection at 1 second intervals.
    - Between highly significant points collect standard points every 20m minimum. More standard points will be needed where there is more deflection in the line being traversed. Collect at least 60 epochs at 1 second intervals for every standard point. Standard points and significant points must be joined within the GPS data using a "connect point" feature on the unit. Raw data being viewed must be a continuous line
- Hand Traverses are to be used where a GPS Dynamic or Static traverse cannot be conducted.
- Traversing new roads by GPS is used for spatial location of the road only. At no time area GPS points along the road to be used within Road eng for the road design. Hand traversing is the only acceptable road traverse for new roads and their design
  - GPS traversing of roads can be utilized for road design if using LiDAR data to design the road in RoadEng
- To combine hand traverse (i.e., conventional) and GPS traverses the cruise manual must be followed: http://www.for.gov.bc.ca/ftp/hva/external/!publish/Web/Manuals/Cruising/chapters/CH3.pdf.
- Hand Traverses must start at the last known Falling Corner collected by GPS and must overlap the Dynamic traverse or Static traverse by a minimum of 50 m. All efforts must be made to make the last known Falling Corner collected by GPS a POT (150 epochs)

- If starting the GPS up again from the hand traverse the GPS traverse must start at the last established Falling Corner and collected as a POC or Highly Significant Point (150 epochs). The Dynamic or Static traverse must overlap the hand traverse by a minimum of 50m.

Ipad/ Handheld

- Utilize Taan Provided Data Dictionary
- Avenza map or similar app to be utilized to collect mapping data
- Forward data collected as a CSV or KML file to Taan Supervisor and mapping

Drone Standards

Registration & Certificates

- Drone owners and pilots and must follow the rules in the Canadian Aviation Regulations (CARs). Part IX – Remotely Piloted Aircraft Systems contains most of the rules that apply to drones. The regulations apply to drones with a maximum takeoff weight ranging from 250 g to 25 kg.
  - Drone pilots must carry a valid drone pilot certificate (basic or advanced) and only fly drones that are registered and marked with the registration number). Registration can be completed on-line (Transport Canada), with a minimal fee.
  - As part of the registration, you must identify if the drone is to be use for Basic or Advanced operations

Basic operations

If all 3 of these conditions are met:

- Flights are in uncontrolled airspace
- Flights are more than 30 m/100 ft horizontally from bystanders
- Flights are never over bystanders

Advanced operations

If at least one of these conditions is met:

- Flights are in controlled airspace
- Flights are over bystanders
- Flights are within 30 m/100 ft horizontally of bystanders

  - The registered owner must notify the Minister in writing within seven days if the aircraft is destroyed, permanently withdrawn from use, missing and the search is terminated, has been missing for 60 days or more, or the registered owner has transferred legal custody and control of the aircraft.
- Pilots must obtain a Basic or Advanced Operation certificate (as applicable) and the certificate must be on your persons when flying.
- Skills must be kept up to date on a recurring two-year basis in order to remain certified (e.g., attending safety seminars endorsed by Transport Canada Civil Aviation, completing a recurrent drone training program, or completing a self paced study program endorsed by TC).

Flights

- Pilots must ensure they have the correct drone type for the desired operations, obtain the required knowledge for operation, follow the drone manufacturer's instructions, and survey the flight area taking note of any obstacles, such as buildings and power lines.
- Any reported unsafe flying will be investigated by Transport Canada and local police may be involved if required.

Flight Safety, Right of Way, and Visual Line of Sight

- Drone pilots must ensure the aircraft remains in Canadian Domestic Airspace and does not enter controlled airspace unless authorized. The National Research Council has created an interactive map to help drone operators find sites away from controlled airspace.
- A pre-flight survey must be completed prior to take-off (landing sites, obstacles, persons, etc.)
- Visual observers can be used to assist the pilot with detecting and avoiding hazards or conflicting air traffic, provided timely and reliable communication is maintained between the pilot and each visual observer during the operation.
- A drone must be operated close enough to another aircraft that there is no risk of collision.
- Right of way must be given to power-driven heavier-than-air aircraft, airships, gliders and balloons at all times.
- If at any time during operation, aviation safety or the safety of any person becomes endangered, the pilot must immediately stop operating the drone.
- The pilot must always be able to take immediate control of the aircraft. The pilot or a visual observer must have the aircraft in visual line-of-sight at all times during flight unless the flight is conducted in accordance with a special flight operations certificate.
- The pilot cannot be operating a moving vehicle, vessel or manned aircraft while flying the drone.
- Ensure optimal weather conditions exist. During icy conditions the aircraft must be equipped with de-icing or anti-icing equipment and equipment designed to detect icing in order to be operated. If any frost, ice, or snow adheres to the remotely piloted aircraft it can no longer be operated.

Maximum Altitude & Distance

- Drones cannot be operated at more than 400 feet/122 m above ground level or 100 feet/30 m above any building or structure if operated within 200 feet/61 m horizontally of the building or structure.
- A special flight operations certificate must be issued for a pilot operate a remotely piloted aircraft at an altitude greater than above mentioned, unless in a controlled airspace in which case authorization has been issued by the provider of air traffic services in the area of operation.
- A drone must not be operated at a distance less than 100 feet (30 m) from another person, measured horizontally and at any altitude, except from a crew member or other person involved in the operation.

Handovers

- In order to mitigate the risk of loss of control of the aircraft, a handoff procedure must be established, and all handovers must be pre-arranged between pilots.

Special Flight Operations Certificate

- Under certain circumstances such as flying a drone (unmanned air vehicle, UAV) above 122 m, the pilot may be granted a special flight operations certificate, providing they demonstrate to the Minister the ability to perform the operation without adversely affecting aviation safety or the safety of any person.

Compliant Operator Applicants

- To gain additional privileges, a pilot may become a “compliant operator” if they:
  - are an experienced UAV operator
  - want to conduct beyond visual line-of-sight UAV operations

- To do so, they must operate a compliant UAV (see list, updated frequently), have appropriately trained pilots and meet specific operator requirements. For more information on the compliant UAV operator program, refer to the UAV Staff Instruction.

Flight Restrictions

- Drone pilots are not allowed to take-off or land within a national park without special authorization.
- Drones cannot be operated over or within the security perimeter established by a public authority in response to an emergency such as traffic accidents, forest fires, and floods, unless the drone is being used to assist in the emergency operation.
- Drones cannot be operated at aviation or advertised events such as an outdoor concert, festival, market or sporting event, unless the pilot is in possession of a special flight operations certificate.

Record Keeping

- Names of the pilots and other crew members who are involved in each flight and the time of each flight or series of flights must be retained for 12 months and made available on request.
- Details of any maintenance, modification or repair performed on the system must be retained for 24 months and made available on request and be provided if there is a transfer of ownership.
- All incidents involving the drone must be document on the CMS Incident Report Form (& Investigation if deemed required). Examples of reportable incidents include:
  - Unintended contact between the aircraft and persons
  - Damage to the airframe, control station, payload or command and control links that adversely affects the performance of the aircraft
  - Any time the aircraft is not kept within horizontal boundaries or altitude limits
  - Any collision with or risk of collision with another aircraft
  - Any time the aircraft becomes uncontrollable, experiences a fly-away or is missing - Any incident for which a police report has been filed or a Civil Aviation Daily Occurrence Report has resulted

Mapping Standards

- For detailed mapping standards, refer to the Silvacare Inc. Taan Mapping SOP document (available on the public drive). The Mapping SOP document is updated fairly frequently, so be sure to check the public drive periodically for the most current version.
- All mapping will use the Taan Base Map, Geodb's and templates located on the Taan File Server.
- The Taan Base Map will be updated concurrently with new data from field verification during layout. The Taan Base map should be downloaded by multiphase contractors bi-annually to ensure the most current version is used. Notify Joni when a new version has been uploaded.
- At all times efficiencies in mapping should be employed and digital versions of mapping versus hard copies should be utilized in the field.
- All maps must include pertinent safety hazards and risks that are identified within the block out adjacent (e.g., steep slopes, gullies, unstable cuts, rock-fall, sink holes/ karsts, snags, mining shafts, avalanche/ landslide, etc.).

- Several maps are expected to be created during the various phases of block development, preferably all in digital format:

1) Recce Map
2) Field Map
3) Cruise Plan Map
4) Cultural Feature ID Map
5) Information Map
6) Cruise Map
7) Appraisal Map & Overview Map (Exhibit 'A')
8) Road Permit Map
8a) Road Permit Overview Map
9) Site Plan Map (Cutblock & Road)
10) Road Instruction Map
11) Road Reactivation Map
12) Harvest Instruction Map
13) Assessment Maps (e.g., windthrow, forest influence, etc.
14) Operational Review Map

Recce Map

- Recce maps will include a high level 'coarse filter' overview map used to guide field recce activities and determine potential boundary locations and field maps including a 1:5,000 11x17 hill shade map showing the planned boundary.
- Recce Maps will be used by Taan to confirm the block location in relation to LUO Objectives and Taan Planning objectives.
- Multiphase contractors will provide Taan with shape file and/or GPS traverse data of recce'd block shape & roads per the Data Submission section of this SOP.
- Taan will overlay the shape to determine if the block development will proceed.
- Recce maps must ensure the following is included:
  - Archaeological/Cultural Features
  - Known and potential Karst Areas
  - Goshawk Territories
  - Saw whet reserves and potential nest sites
  - MAMU habitats
  - Mushroom Habitats
  - Fish habitats
  - Wildlife habitats (known bear dens, raptor nests, heron nests)
  - Rare ecosystems
  - Visual sensitivities
  - Adjacent development areas and WTRA's
  - Watershed and sub-Unit restrictions
  - Known Invasive plants
  - Adjacent Forest Reserves, CSAs, WHAs,
  - Adjacent Tenures, other Licensee developments
  - Utilities, highways

- SUPs, Road Permits and FSRs
- Permanent Sample Plots and research plots/areas

- Mapped Reserves (Recreation, Roads, rock, etc)
  - Shape file and GPS traverse data of recce'd block shape & roads are filed Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Geomatics/Data/Recce or Shared/Public Engineering/Contactor/Cutblock ID/Geomatics and named per the Taan File Naming Convention procedures. Maps are filed under Geomatics.

Cruise Plan Map

- Cruise Plan Maps are created after the layout and traverse of the block boundary and roads. Cruise Plan Maps will be the first data check by mappers to ensure proper block location and shape.

- Cruise Plan Maps are placed directly under Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Geomatics or Shared/Public Engineering/Contactor/Cutblock ID/Geomatics and named per the Taan File Naming Convention procedures.

Cultural Features Identification (CFI) Survey Map

- CFI Maps are created using the templates required by the Council of the Haida Nation as part of their survey process. CFI Maps are created by the contractor and their CFI surveyor.
- CFI maps must follow Taan mapping formats as closely as possible.
- Final CFI Maps are placed directly under Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Assessments/CFI & Arch or Shared/Public Engineering/Contactor/Cutblock ID/Geomatics and named per the Taan File Naming Convention procedures.

Information Map

- The Information Map is used for review and discussion purposes with the Council of Haida Nation and the Heritage Resource Committee. The Information Map is submitted in conjunction with, or prior to, the Permitting processes.
- Information Maps are placed directly under Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Geomatics or Shared/Public Engineering/Contactor/Cutblock ID/Geomatics and named per the Taan File Naming Convention procedures.

LUO Relocation Map

- A due diligence LUOO Relocation Map should also be prepared simultaneous with the Information Map.

Cruise Map

- The Cruise Map (final) will include cruise plots (identify cruised vs. Out), cruise strip-lines (directional strip lines and tie lines) and cruise area summary with timber type.
- Filing required for Cruise Maps are placed directly under Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Geomatics or Shared/Public Engineering/Contactor/Cutblock ID/Geomatics and named per the Taan File Naming Convention procedures:

Appraisal Map (Exhibit 'A')

- The Appraisal Map (Exhibit 'A') will be created from the base of the Information Map, and is a combination of the Harvest Instruction Map, the Road Instruction Map and the Road Reactivation Map.

  An Overview Map is also required to be completed to accompany the Appraisal Map.
- Appraisal Maps (Exhibit 'A') are placed directly under Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Geomatics or Shared/Public Engineering/Contactor/Cutblock ID/Geomatics and named per the Taan File Naming Convention procedures.
- Supporting data/ info must also be appropriately filed:
  - Outstanding assessments
  - Permanent Access Structure Calculations and Road width
  - Final Road design
  - Final Road Instructions
  - Final Harvest Instructions

Road Permit Map

- Where required.
- Road Permit Maps are placed directly under Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Geomatics or Shared/Public Engineering/Contactor/Cutblock ID/Geomatics and named per the Taan File Naming Convention procedures.
- The Road Permit Overview map accompanies that Road Permit map on submission

Site Plan Map (Cutblock & Road)

- Cutblock Site Plan – if all roads are being built within the development area. Cutblock and Road Site Plan – only if there is road being built outside the development area.
- The Site Plan Map will be used for the Silviculture Obligations of the regenerating stand after harvest completion.
- Site Plan Maps are placed directly under Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Geomatics or Shared/Public Engineering/Contactor/Cutblock ID/Geomatics and named per the Taan File Naming Convention procedures.
- Road Instruction Map
- Where end haul is planned, ensure that the Road Instructions contain specific instructions to meet the OH&S requirements under section 20.78-1a. Where the terrain assessment indicates any specific instructions regarding conceptual ¾ and full bench construction design, ensure they are included in the instructions.
- Ensure that information related to any Monumental Cedar to be harvested as part of the HG Cultural Wood Access Program is clearly indicated on the map and correctly matches the identified monumentals in the field.
- Road Instruction Maps are placed directly under Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Geomatics or Shared/Public Engineering/Contactor/Cutblock ID/Geomatics and named per the Taan File Naming Convention procedures. Final map contains the instructions on the back page.

- Road Instruction map text (back of map) is filed under Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Engineering/General or Shared/Public Engineering/Contactor/Cutblock ID.

Road Reactivation Map

- Road Reactivation Map includes road reactivation culvert and reconstruction table.

  Ensure that information related to any Monumental Cedar to be harvested as part of the HG Cultural Wood Access Program is clearly indicated on the map and correctly matches the identified monumentals in the field.
- Road Reactivation Maps are placed directly under Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Geomatics or Shared/Public Engineering/Contactor/Cutblock ID/Geomatics and named per the Taan File Naming Convention procedures. Final map contains the instructions on the back page.
- Road Reactivation map text (back of map) is filed under Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Engineering/General or Shared/Public Engineering/Contactor/Cutblock ID

Harvest Instruction Map

- Ensure that information related to any Monumental Cedar to be harvested as part of the HG Cultural Wood Access Program is clearly indicated on the map and correctly matches the identified monumentals in the field.
- Harvest Instruction Maps are placed directly under Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Geomatics or Shared/Public Engineering/Contactor/Cutblock ID/Geomatics and named per the Taan File Naming Convention procedures. Final map contains the instructions on the back page.
- Harvest Instruction map text (back of map) is filed under Taan Server://Shared/Planning/Tenure/TenureID/Cutblock/CutblockID/Engineering/General or Shared/Public Engineering/Contactor/Cutblock ID

Operational Review Map

- The Operational Review Map is used to accompany the Briefing Note for RP and CP submissions

Filing Standards

- Do not use the Microsoft Outlook message format .msg files. Please convert email files to .pdf when saving.
- Ensure that all obsolete or old versions of files are marked appropriately and moved to the designated archive folder. Only the current versions of plans and maps should be in the main folder, all drafts and out of date versions must be appropriately identified and archived.
- Taan personnel may clean out Archive folders, as appropriate.

File Naming Conventions

- All correspondence related items will be named with the numerical date, followed hyphen, followed by a description of the correspondence (e.g., 20110630-AWUN001 Email Approval Joint Solutions Table.

- All other files will be named with the applicable Cutblock, Road, Cutting Permit or Road Permit ID or project, 'hyphen', and appropriate name of the file, 'hyphen', followed by the numerical date (yyyymmdd), (e.g., JUN005-Harvest Instruction Map-20110630.pdf.
- Where applicable, ensure that "draft" files are identified with "Draft" following the file names above (separated by hyphen from the standard file name). E.g., JUN005-Harvest Instruction Map-20110630-Draft.pdf

  .mxd should be named according to block name and type of map (i.e. GLD001 Harvest Instruction Map.mxd, GLD001 Site Plan Map.mxd and GLD001 Road Instruction Map.mxd).
  .mxd files must not include a date.

Planning Supplemental Procedures:

Migratory Birds

From the Land and Spirit of the Haida

Introduction

Objective

The following *Operations Supplemental Procedures: i*s developed specifically for Taan Forest LP and its Contractors

The objective of these Procedures are to:

Provide written guidance to employees and contractors for the identification and procedures to follow when a migratory bird or nest of a migratory bird is encountered

Minimize incidental take which can be defined as: When birds, their nests, or eggs are destroyed during activities like logging, road-building or brushing that do not intend to destroy birds or nests, it is called 'incidental take'.

Identify migratory birds and their nests to plan according to avoid harming them.

Plan activities accordingly to avoid harming migratory birds.

Scope

These procedures apply to all Taan operational activities including the following:

Planning

Road Construction

Falling

Health and Safety are the first priorities. Under no circumstances are these procedures to replace, or come before Taan Forest's Health and Safety Policy or Standard Operating Procedures. These Procedures apply to all Taan Forest personnel, including employees, consultants and contractors working within Taan Forest Tenures

Planning

Training

Taan will train staff and logging contractors in bird and active nest identification. Indication of an active nest include but are not limited to:

- Seeing a nest with eggs
- Birds flying up or out just in front of you
- Birds swooping at you or attacking you
- Birds dropping down in front of you without flapping their wings
- Cheeping coming from tree cavities or trees or shrubs
- Birds flying into tree cavities.

Field – pre-harvest

Taan's engineering and field staff shall attempt to identify migratory birds and their nest during cut block development

Should an active nest be identified the nest area should be placed within stand level retention

During forestry development work, identify areas or features that may support or have a high likelihood of having nesting bird activity. Include identified areas and features in internal or external retention. These areas may include, but are not limited to:

- Riparian areas including wetland and wetland complexes,
- Large snags,
- Deciduous leading areas or individual trees.

Falling and Harvesting Operations

Taan's logging contractors shall attempt to identify migratory birds and their nest during harvesting operations.

If a nest is identified during harvesting operations, then a no-work zone of 1 tree length should be placed around the nest until the nest becomes unoccupied

Taan Forest Hydrological Recovery Calculation Procedures (Upland Stream Sub-Units, Sensitive Watersheds & FSC Watersheds)

Overview

The Haida Gwaii Land Use Objectives Order (HGLUOO) utilizes hydrological recovery targets to meet objectives set in the HGLUOO for Sub-Unit harvest levels and Sensitive Watershed harvest levels. Taan also uses hydrological recovery targets to meet FSC ® standards for watershed management. Hydrological recovery is the ability of a landscape to "handle water". An undisturbed landscape has 100% recovery. The forests, swamps, water-courses, alpine tundra and all natural occurring non-productive land contribute to the landscape's ability to manage water. Natural disturbances to a forest (wind, fire) and human-made disturbances (harvesting, urban and rural developments) negatively affect hydrological recovery. When forests are depleted hydrological recovery (ability to handle water) for that stand of forests is generally assumed to be "zero". As the stand develops, it's ability to handle water increases.

A qualified hydrologists can determine a landscape/ watershed's ability to handle water. Factors include elevations for snow influence, typical rainfall events, soil porosity, water sinks/ or holds (Lakes, swamps) and forest cover. The hydrologists can determine the amount of forest cover that can be removed without impacting the landscape's ability to handle water. and develop curves to determine when a recovering stand will start to influence hydrological recovery.

Much of the HGLUOO targets of hydrological recovery were set by Glynnis Horel during the development of the Great Bear Rainforest Land Use Order and adopted into the HGLUOO. In determining hydrological recovery curves to be utilized for TSR calculations and for the HGLUOO analysis, Bill Floyd's curves for recovery were utilized, therefore much of the analysis work utilizes "Floyd's curves". Where Taan or other licensees have had a qualified hydrologists develop new curves for a watershed, they are utilized for that watershed instead of Floyd's curves (Horel, Milne).

Basic recovery calculations utilized in this analysis are:

Upland Steam Sub-Unit Calculation

((Total Hydrological Recovery Area of Sub-Unit – Type I and Type II Fish Habitat)) / (Total Area of sub-unit less Type I and Type II Fish habitat)) X 100

Sensitive Watershed Calculations

(Total Hydrological Recovery Area of Sensitive Watershed / Total Area of Sensitive Watershed) X 100

Watershed (FSC)

(Total Hydrological Recovery Area of Watershed / Total Area of watershed) X 100

Due to the shear number of individual stands, varying degrees of stand development, growth of trees, new development area and numerous boundaries and zones a GIS analysis is completed to determine hydrological recovery.

Creating Spatial Dataset

The hydro recovery analysis requires creating a dataset made up of overlaying the following layers:

- Latest forest cover layer
- Watersheds (including Schedule 7 Sensitive Watersheds)
- Schedule 6 Upland Stream Subunits
- Type 1 & 2 stream buffers
- Relevant Tenure layer

VRI Update

If using VRI Vegcomp layer for the forest cover component of the hydro recovery analysis a Non-

Productive attribute is required. All polygons that are non-productive natural are considered 100% recovered, as NP polygons are all they ever will be, they have no chance of contributing more. VRI no longer has a single NP field as they used to. Silvacare is presently using the following criteria to determine what is NP (Jeff Mosher & Ken MacPhail determined these definitions).

BCLCS_LEVEL_1 = 'N' AND HARVEST_DATE IS NULL
BCLCS_Level_2 = W, N (water, non-treed)
BCLCS_Level_3 = W, A (wetland, alpine)
BCLCS_Level_4 = Everything except the TC, TB, TM AND HARVEST_DATE IS NULL
BCLCS_Level_5 = Everything except DE, OP, CL, SP AND HARVEST_DATE IS NULL
SITE_INDEX <= 10 AND HARVEST_DATE IS NULL
Nothing with a harvest_date should be NP.

UPDATING AGE & HEIGHT

A new field in the VRI is required to be added for stand age. If there has been any logging since the last VRI update it will need to be depleted and have this age field updated accordingly. Also, depending on what year the VRI data has been projected to, the years of growth may hve to be added to the "Age" field. For example, if the Projected_Age field was 2 years past, then the trees should be aged by 2 years. After the ages have been updated, the height field can be projected. Height is required to determine hydro recovery percent based on the Floyd method (or other curves). If the forest cover has been projected recently this step is not required. Any blocks that are depleted must have the height updated to reflect it has been logged. A table has been created that uses leading species, age & site index to project the new height. A new field must be created with these 3 fields concatenated into one. Leading species + Site index + Age. A join to the New Heights table you can update the tree height field. (note: the new heights table doesn't include any records for polygons with SI < 8 but we are considering all with site index <= 10 to be non-productive, therefore 100% recovered, so not necessary. And the maximum age included is 100 but anything over 60 years is 100%, so also not necessary. There are no records for Alder leading polygons, there aren't many, for these we used secondary species.)

CALCULATING HYDRO RECOVERY PERCENTAGE

- All stands > 60 years are considered 100% recovered.
- All non-productive stands are considered 100% recovered.
- Using the height field, a join is done with the Floyd table to acquire the hydro recovery % of that polygon.
- The polygon area is multiplied by the hydro recovery % to give the hydro recovered area for that polygon.

Watershed_Name	Sensitive_Wa	Height_2018	Hectares	Hydro_Rec_Perc_201	Hydro_Rec_AREA_2018	Tenure
Beattie Anchorage Residua	Yes	13.2	4.33653731085	84.62881	3.66995992137836	Taan
Beattie Anchorage Residua	Yes	8.3	2.11529520105	55.86645	1.181740335847	Taan
Beattie Anchorage Residua	Yes	8.3	4.30095920025	55.86645	2.40279322112807	Taan
Beattie Anchorage Residua	Yes	18.8	7.5507529824	95.39522	7.20305741921704	Taan
Beattie Anchorage Residua	Yes	23.9	2.75808691905	98.46379	2.71571691199086	Taan
Beattie Anchorage Residua	Yes	29.9	4.94372107625	99.57776	4.92284670837764	Taan
Beattie Anchorage Residua	Yes	13.2	8.5830069576	84.62881	7.26369665043409	Taan
Beattie Anchorage Residua	Yes	29	3.7030322435	99.4875	3.68405420325206	Taan
Beattie Anchorage Residua	Yes	18.8	34.7255633516	95.39522	33.1265275554982	Taan
Beattie Anchorage Residua	Yes	12.4	5.25293491665	81.74032	4.29376581026144	Taan
Beattie Anchorage Residua	Yes	13.2	11.7124246695	84.62881	9.91208561994428	Taan
Beattie Anchorage Residua	Yes	11.2	2.56231770565	76.3587	1.95655248990417	Taan

PARK AREA

Area summaries are done by watershed & subunit within the Licensees tenure. Any watershed or subunit that contains park area, the percentage of that watershed or subunit that the licensee has

ownership to, they can claim that percentage of the park for hydro recovery. Take the licensee area within a watershed or subunit / total area of all tenures within that watershed or subunit to determine the park percentage available. You can use this percentage to add to the licensee's area available.

WATERSHED SUMMARY

Hydro recovery is calculated by totalling the hydro recovered area within the licensee's portion of a watershed divided by the total area of the watershed available to the licensee (including park portion where available).

Watershed_Name	Sensitive_Wa	Taan_HR_Area2018	Taan_WS_Area	Hydro Recovery Percent
Awun River3	Yes	1921.66412383106	2257.00699690856	0.851421429558338
Baxter Creek	Yes	319.680550009787	320.191587707953	0.998403962759222
Beattie Anchorage Residual1	Yes	1762.10591864765	1806.13824181339	0.975620734810679
Beattie Anchorage Residual2	No	1498.6753672683	1589.03948413865	0.943132868772403
Begbie Penninsula Residual2	No	809.347283322668	919.507606066553	0.880196398575617
Begbie Penninsula Residual3	No	1355.34574776431	1374.73606811765	0.985895241419041
Begbie Penninsula Residual6	No	963.694787462533	1192.6978826124	0.80799572256448
Begbie Penninsula Residual7	No	1188.44606445462	1342.08685927195	0.88552097522162

Non-sensitive watersheds the area available for logging is anything over the 75% recovery required. Sensitive watersheds area available for logging is anything over the 80% recovery required. Sensitive watersheds are also capped with only 5% of the watershed that can be logged within a 5 year period.

SUB-BASIN SUMMARY

Hydro recovery is calculated by totalling the hydro recovered area within the licensee's portion of each sub-basin (less the type 1&2 buffers & lake area removed) divided by the total area of the watershed available to the licensee (less the type 1&2 buffers & lake area removed), including park portion where available. The sub-basin area available is the area over the 70% recovered.

basin_poly	Taan_SB_HR_Area20	Taan_SB_Area	Subasin Hydro Recovery P	Tenure
128	124.833090959323	141.607233399648	0.881544593184834	Taan
132	287.813533208561	293.622375055647	0.980216624002226	Taan
136	712.450782391188	790.001216346701	0.901835044869754	Taan
139	44.494849651453	44.4962770499996	0.999967920944373	Taan
142	438.419338244496	444.0244268481	0.987376621049	Taan
145	40.1772490312204	61.4783350498501	0.65351882087637	Taan

Appendix L: Haida Gwaii Licensees' FSPs Implementation Agreement

Haida Gwaii Licensees' FSPs Implementation Agreement

April 16, 2018

The undersigned Parties commit to working collaboratively and as per individual Forest Stewardship Plan (FSP Results or Strategies) to ensure the Haida Gwaii Land Use Objectives Order targets are met. In particular, FSP implementation as it relates to Cedar Stewardship Areas, Upland Stream Areas, Sensitive Watersheds, Ecological Representation and Marbled Murrelet Nesting Habitat. Individually and when required collectively, the Parties will conduct inventory assessments, determine proportional targets, and establish tracking and reporting mechanisms that demonstrate achievement of FSP Results or Strategies.

By signing this agreement, the Parties agree to work collaboratively to ensure:

1. Haida Gwaii Land Use Objectives Order targets are met consistent with Forest Stewardship Plan (FSP) Results or Strategies including but not limited to Cedar Stewardship Areas, Upland Stream Areas, Sensitive Watersheds, Ecological Representation and Marbled Murrelet Nesting Habitat. Within the TFLs, the targets will be based on proportional tenure area; while in the TSA, targets will be based on Allowable Annual Cut (AAC) apportionment.
2. The Licensees will complete analyses (independently for area based tenures, including FLTC A87661); or as a group for volume based tenures. Licensees will provide annual reports to the Province (MFLNRORD) and the Council of the Haida Nation (CHN). Licensees will report individually and as a group depending on the HGLUOO/FSP requirement.
3. Proposed development area information is shared at least annually with the effected Parties in shared Landscape Units (e.g. watersheds, and/or watershed sub units, Cedar Stewardship Area harvesting).
4. Manage the cedar (red and yellow) harvest volumes as set by the Chief Forester's partition within the TSA.
    a. The volume of cedar will be changed in accordance with new AAC determinations.
    b. Each Licensee will submit to the Council of Haida Nation and the MLLNRORD, a cedar (red and yellow) harvest volume report for cedar harvested on TSA 25 in the previous calendar year consistent with the Chief Forester's cedar partition.
    c. Individual Cedar Management Strategies will be provided by Licensees as to how each licensee will manage and report their portion of the partition.

The term of this agreement will be from the date signed and will remain in place for the duration of the licensee's FSPs approved in 2018, until such time as a new agreement is reached or the agreement is cancelled by the parties.

This agreement may be amended from time to time with mutual consent of the parties.

Additional Licensees may join this agreement with mutual consent of the parties.

Licensee	Authorized Signatory & Title	Signature	Date
Taan Forest Unit 3 Hwy 16 Commercial Cent Box 1384 Skidegate, BC V0T 1S1 Ph: (250) 559-2337 Fx: (250) 559-2367	Jeff Mosher, RPF Planning Manager		April 16, 2018
Husby Group 6425 River Road Delta, BC V4K 5B9 Ph: (604) 940-1234 Fx: (604) 940-1236	Rob Sandberg, RPF VP Forestry & Engineering		APRIL 16, 2018
A&A Trading Ltd. 1210-1111 Melville St. Vancouver, BC V6E 3V6 Phone: (604) 684-2107 Fax: (604) 689-0977	Dave Marquis, RPF Forestry Manager	David Marquis	April 16, 2018

Appendix M: Taan Forest 2018 Haida Gwaii TSA 25 Cedar Management Strategy.

Taan Forest 2018 Haida Gwaii TSA 25 Cedar Management Strategy

Within the Timber Supply Area 25, 195,000m3 of cedar (red and yellow), based on the current AAC for the TSA, has been partitioned for harvest. In conjunction with a cedar management strategy the partition is to ensure focused and measurable cedar management to achieve a more robust and sustainable socioeconomic return for the people of Haida Gwaii.

The current AAC of the TSA of 512,000m3 has a cedar partition of no more than 195,000 m3 of cedar (red and yellow).

Licensees and BCTS within the TSA area have signed an implementation agreement for their respective FSP's and have agreed to ensure the 195,000 cedar partition is not exceeded.

Licensees are managing their allocation of cedar, based on the percent volume or AAC in the TSA separately.

Within the TSA area, Taan has an area based tenure known as the Haida Tenure. Taan Forest is committed to ensuring this partition is not exceeded within the Haida Tenure.

The current AAC in the Haida Tenure Area for Taan Forest is 120,000m3 with a cedar partition of 45,703m3. The cedar allocation of 45,703 m3 will change with changing AAC determinations.

Cedar Management:

Maintaining the partition within the Haida Tenure:

Taan proposes the partition allocation within the Haida Tenure be averaged over 5 year periods

- The 1st 5 year period starts January 1, 2018. This is to simplify reporting and tracking of HBS volumes versus November 1, 2017 as per the Chief Forester's October 24, 2017 cedar partition letter to the HGMC.
- Over any 5 year period the total cedar harvested cannot exceed 228,515m3
- Cedar (red and yellow) numbers are based on date of scale by licensed scalers as submitted to the Ministry's Harvest Billing System
- All reportable cedar harvest numbers include waste and residue numbers
- Taan will maintain a ledger of cedar volume harvested by year within the Haida Tenure Area
- Taan will submit cedar harvest numbers within the Haida Tenure Area to the CHN by January 31st annually

Duration

This strategy remains in in effect until the AAC for the FLCTS is re-determined or the FLC A87661 area becomes a First Nation Woodland Tenure and removed from TSA 25

Jeff S. Mosher, RPF
Planning Manager

Appendix N: Training Requirement Matrix.

Training Requirements Matrix

Retrain Interval	Annual													3 Yr		5 Yr			N/A						
Course #	H01	C01	C02	C03	C17	C04	C05	C06	C23	C07	C08	C09	C17	C10	C11	C12	C13	C15	C16	C18	C19	C20	C21	C22
The following Training requirements apply to each position, whether filled by employee or contractor:	HalCo Employee Handbook & Sustainability Statement	CMS Awareness Level 1 Training Package	Common SOP	Operations SOP	Log Marketing & Custom Cut SOP	Planning SOP	Hazmat SOP	EPRP SOP (& Supplemental where applicable)	Silviculture SOP	ERAP (Explosives)	Forest Fire Suppression Training Course (S10A)*	Emergency Drill (e.g., Spill, Fire)	Invasive Plants Training Pk.	CMS Awareness Level 2 Training Course	TDG Training Course	Blasting Ticket (WorkSafe BC)	Pesticide Applicators Certificate	Faller Certification (WorkSafe BC)	Pleasure Craft Operator Certificate (PCOC)	Small Vessel Operator Proficiency (SVOP)	Radio Operator Certificate (ROC-MC)	Marine Emergency Duties (MED) A3 Certificate	Basic Forestry Supervisor	Basic Incident Investigation
Taan																								
President	✓																							
Manager, General	✓	✓	✓	✓			✓	✓			✓	✓		✓										
Manager, Log Marketing; Log Marketing Assistant, Coordinator, Custom Cut	✓				✓									✓										
Supervisor, Harvesting	✓	✓	✓	✓			✓	✓			✓	✓	✓	✓									✓	✓
Administrator, CMS	✓							✓				✓		✓										
Manager, Planning	✓	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓									✓	✓
Supervisor, Planning Contract	✓	✓	✓			✓	✓	✓			✓	✓	✓	✓									✓	✓
Operations Forester	✓	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓									✓	✓
Assistant Engineer	✓	✓	✓			✓	✓	✓			✓	✓	✓	✓										
Assistant Forester/ Assistant Silviculturalist	✓	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓										
Junior Crew	✓	✓	✓			✓	✓	✓	✓		✓	✓	✓											
Quality Control	✓	✓	✓					✓			✓	✓		✓										
Accountant, Operations	✓	✓			✓			✓				✓												
Administrator, Office	✓	✓						✓				✓												
Contractors																								
Contractor Principles & Supervisors/ Foreman (Operations)			✓	✓			✓	✓		✓*	✓	✓		✓	✓1								✓3	✓3
Contractors Principles & Supervisors (Planning & Other)			✓			✓	✓	✓	✓*		✓	✓		✓	✓1		✓*						✓3	✓3
Planning & Engineering Crew		✓	✓			✓	✓	✓			✓	✓	✓		✓1									
Forestry/ Silviculture Crew		✓	✓			✓	✓	✓	✓		✓	✓	✓		✓1		✓*							
Falling Crew		✓	✓	✓			✓	✓			✓	✓						✓						
Harvesting Crew, DLS Crew		✓	✓	✓			✓	✓			✓	✓												
Driver, Log Truck		✓	✓	✓			✓	✓			✓	✓												
Road Crew		✓	✓	✓			✓	✓			✓	✓	✓2											
Driller / Blaster		✓	✓	✓			✓	✓		✓	✓	✓			✓1	✓								
Shop Crew, Mechanic, Warehouse Personnel		✓	✓	✓			✓	✓			✓	✓												
Driver, Rock Truck		✓	✓	✓			✓	✓		✓	✓	✓												
Driver, Fuel Truck		✓	✓	✓			✓	✓			✓	✓			✓									
Boom Boat Operator		✓	✓	✓			✓	✓			✓	✓							✓					
Crew Boat Operator																				✓	✓	✓		

✓ = Training Required

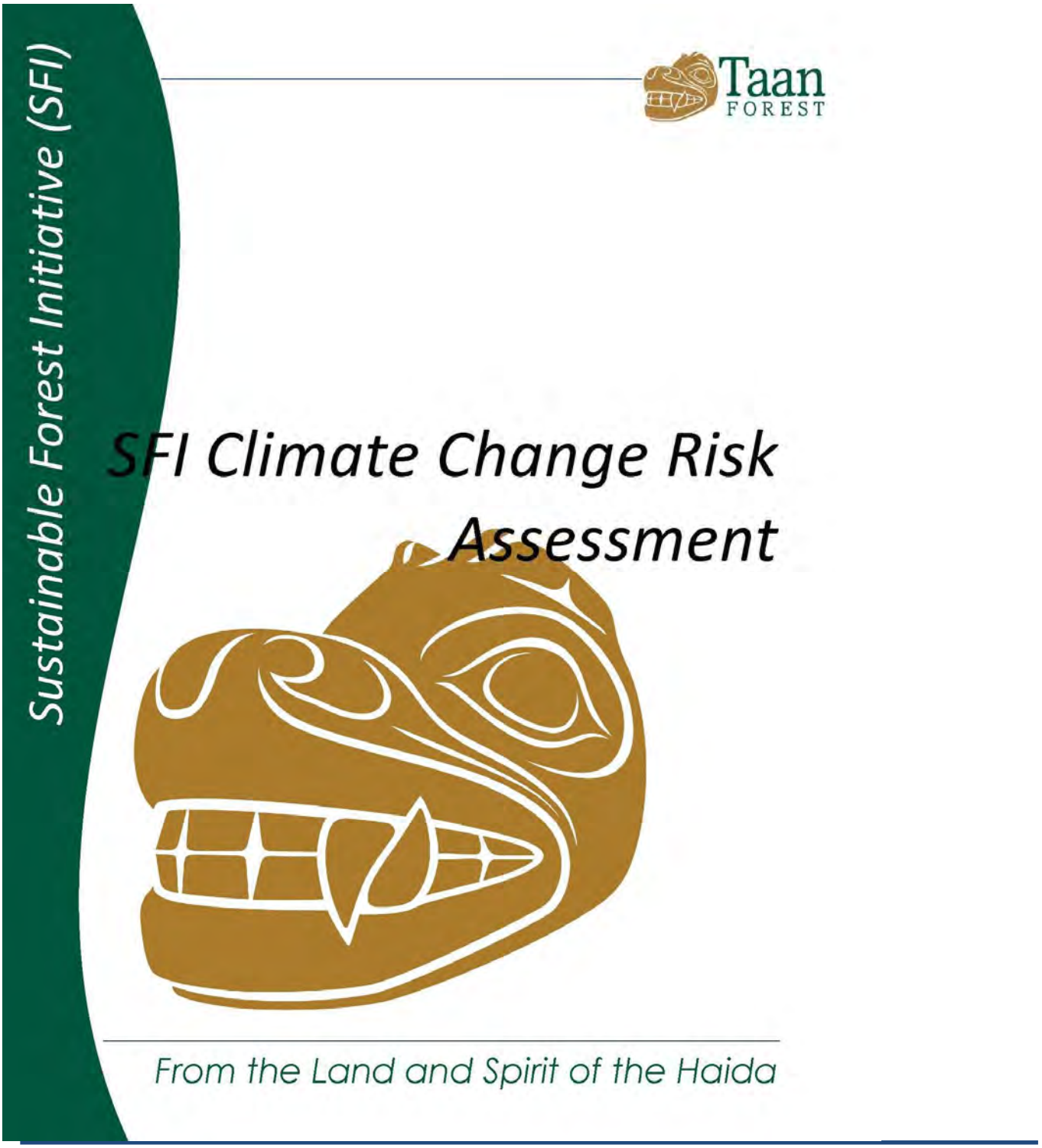
Complete a Training Record Form for completed training and place on file.

Training Requirements Matrix

Notes:

- * Indicates training is only required where applicable to specific job positions/ responsibilities
- [1]TDG training, blasting ticket, Pesticide Applicators Certificate, ERAP review is required only where applicable.
- [2]Invasive Plants Training for Road Crew only required for road maintenance workers
- [3] Forest Safety Council Basic Forest Supervisor and Incident Investigation training is strongly recommended for all Contractor Principles and Supervisors and is a requirement for SAFE certified companies
- [4] Contractors are expected to ensure that all workers have current fire-fighting training (S100 and applicable annual refresher training)
- Personnel conducting job titles on a temporary basis must complete training requirements for the temporary role.
- Additional training may be required where specified under contract agreements (e.g., Fire Training).
- CMS Orientation Checklist is also required for all new hires, including young workers. It may also be used to complete re-training where requested by a worker or where a Supervisor deems re-training is required.
- First Aid Attendants also require Level 1 with Transport or Level 3, per First Aid requirements (WorkSafe BC). First Aid Level 1 training or Marine First Aid basic level is required for anyone with an SVOP certificate.
- Driver's License classifications and Air Brake Certification required where applicable (e.g., Air Brake Endorsement Certificate Code 19 Highway).
- This matrix descries the training that is required under Taan's Corporate Management System (in additional to legal requirements); Contractors are also responsible to ensure that any training required under specific safety programs is also completed and documented (e.g., policies, job safety breakdowns, safe work procedures, etc.).

Appendix O: Climate Change Risk Assessment – Sustainable Forest Initiative



Executive Summary

Taan Forest (Taan) has committed to obtaining certifications to Sustainable Forestry Initiative (SFI) Sustainable Forest Management certification by early fall 2022. As part of the certification efforts Taan has reviewed climate change consistent with Objective 9 Climate Smart Forestry (To ensure forest management activities address climate change adaptation and mitigation measures). The following Risk Assessment is a review specific to Haida Gwaii and is based on the Strategic Climate Risk Assessment Framework for British Columbia (developed in progress toward a Strategic Climate Risk Assessment for British Columbia July 2019). This framework is consistent with the ISO 31000 process, to evaluated climate-related risks.

The goal of the risk assessment is to enable Taan to compare different significant climate-related risks; compare those with other risks; develop priority-based responses in an adaptation plan; and identify potential situations where current response capacity may be exceeded. It should be noted that the assessment and associated planning will ideally be shared with land owners, local government and other land managers for coordination of efforts. Finalized and approved assessments may be submitted to the BC Risk Register

The following is a summary of steps used to develop this local risk assessment:

- Step 1 Identify risk events (causes, local significance)
- Step 2 Analyze Risks (likelihood & consequence)
- Step 3 Evaluate Risks
- Step 4 Identify preventative and mitigative measures in place
- Step 5 Identify gaps and action items

Step 1 Identify Risk Events

The following list of Risk events are based on the BC Risk Assessment and additional localized risk events.

Risk Event	Risk Cause(s)	Example Impacts	Significant Consequences?	Plausible by 2050?
1. Heat wave / dome	Higher temperatures	• Safety risks • Stress to flora and fauna	• Health • Natural resources	Yes
2. Severe coastal storm	Coastal storm Sea level rise	• Safety risks • Flooding/ damage of roadways and other infrastructure • Erosion, land loss, shoreline change	• Loss of life • Cultural resources • Natural resources • Economic vitality • Transportation infrastructure	Yes
3. Extreme precipitation and landslide	Heavy precipitation	• Safety risks • Flooding & damage of roadways and other infrastructure	• Loss of life • Cultural resources • Natural resources • Economic vitality • Transportation infrastructure	Yes
4. Increased incidence of vector-borne disease	Multiple	• Safety risk	• Injuries/ disease	Yes
5. Rising Water temperature	Higher temperatures	• Reduced aquatic life vitality • Ecosystem disruption	• Cultural resources • Natural resources • Economic vitality • Transportation infrastructure	Yes
6. Saltwater intrusion	Sea level rise	• Reduction in fresh water • Ecosystem disruption	• Cultural resources • Natural resources	Yes
7. Ocean acidification	Higher temperatures Higher Carbon	• Reduced aquatic life vitality • Ecosystem disruption	• Cultural resources • Natural resources • Economic vitality	Yes
8. Increase in Invasive Species	Multiple	• Ecosystem disruption	• Cultural resources • Natural resources • Economic vitality	Yes
9. Catastrophic Winds	Changing temperatures	• Safety risks • damage of roadways and other infrastructure	• Safety risk • Cultural resources • Natural resources • Economic vitality	Yes
10. Seasonal water Shortage	Multiple	• Reduced aquatic life vitality • Ecosystem disruption	• Cultural resources • Natural resources • Economic vitality	Yes
11. Loss of forest resources (Yc)	Multiple	• Reduced aquatic life vitality • Ecosystem disruption	• Cultural resources • Natural resources • Economic vitality	Yes
12. Increase pest and disease	Multiple	• Reduced aquatic life vitality • Ecosystem disruption	• Cultural resources • Natural resources • Economic vitality	Yes

Risk Events considered but not included (i.e., likelihood rating of 1 or 2) are Severe riverine flooding, Severe wildfire, Moderate riverine flooding, Reduction in ecosystem connectivity, Glacier mass loss, and Long-term water

shortages. Note other risk events not considered in the BC analysis are not considered in this analysis.

Step 2 Analyze Risks

The following criteria are used to analyze risk.

Likelihood Rating Scale for Discrete and Ongoing Climate-Related Risk Events

Likelihood	Rating	Criteria for Discrete Climate-Related Risk Events	Criteria for Ongoing Climate-Related Risk Events
Almost certain	5	Event is expected to happen about once every two years or more frequently (i.e., annual chance ≥ 50%*).	Event is almost certain to cross critical threshold.
Likely	4	Event is expected to happen about once every 3-10 years (i.e., 10% ≤ annual chance < 50%).	Event is expected to cross critical threshold. It would be surprising if this did not happen.
Possible	3	Event is expected to happen about once every 11-50 years (i.e., 2% ≤ annual chance < 10%).	Event is just as likely to cross critical threshold as not.
Unlikely	2	Event is expected to happen about once every 51-100 years (i.e., 1% ≤ annual chance < 2%).	Event is not anticipated to cross critical threshold.
Almost certain not to happen	1	Event is expected to happen less than about once every 100 years (i.e., annual chance <1%).	Event is almost certain not to cross critical threshold.

*Annual chance is the probability that an event will occur in a given year

Confident Rating Guidelines

High confidence	Medium confidence	Low confidence
Multiple sources of independent evidence based on reliable analysis and methods, with widespread agreement	Several sources of high quality independent evidence, with some degree of agreement	Varying amounts and quality of evidence and/or little agreement between experts; or assessment made only using expert judgment

Risk Evaluation - Likelihood			
Event	**Type**	**Rating**	**Confidence**
1. Heat wave / dome	Discrete risk	3	Low
2.Severe coastal storm	Discrete risk	3	Low
3.Extreme precipitation and landslide	Ongoing risk	3	Low
4.Increased incidence of vector-borne disease	Ongoing risk	2	Low
5.Rising Water temperature	Ongoing risk	3	Low
6.Saltwater intrusion	Ongoing risk	3	Low
7.Ocean acidification	Ongoing risk	3	Low
8.Increase in Invasive Species	Ongoing risk	3	Low
9.Catastrophic Winds	Ongoing risk	4	Low
10.Seasonal water Shortage	Discrete risk	3	Low
11.Loss of forest resources (Yc)	Ongoing risk	4	Low
12.Increase pest and disease	Ongoing risk	4	Low

Note, the confidence is rated as low in the initial assessment, as further data gathering will need to take place to

rise confidence where possible.

Consequence Categories and Scales are based on the categories for the BC risk assessment:

Categories To develop a set of consequence categories for the B.C. risk assessment, we considered the following guiding principles:

- Consequence categories should resonate with diverse stakeholders in B.C. and capture important consequences to quality of life in the province
- Categories should be detailed enough to be meaningful, while being manageable enough to evaluate within the resources of this project The resultant set of categories is:
- Health
    - o Loss of life
    - o Morbidity, injury, disease, or hospitalization
- Social functioning
    - o Psychological impacts
    - o Loss of social cohesion (e.g., equity, housing/food affordability, trust in government, and other elements of social fabric)
- Cultural resources
    - o Loss of cultural resources (i.e., a human work, an object, or a place that is determined, on the basis of its heritage value, to be directly associated with an important aspect or aspects of human history and culture) (Parks Canada, 2013)[4]
- Natural resources o Loss of natural resources (e.g., natural environment and ecosystem services)
- Economic vitality
    - o Loss of economic productivity (e.g., impacts to key industries or jobs)
    - o Loss of infrastructure services (e.g., transportation, water, or energy services)
- Cost to provincial government

In development of these categories through desk research, a workshop, and written feedback from subject matter experts, we considered a range of options, from high-level categories of People, Economy, and Environment, to more detailed categories such as deaths, injuries or illnesses, infrastructure damage ($), direct economic impacts, indirect economic impacts, effects on equity, effects on daily life, effects on natural resources, and effects on cultural resources. The resultant set of categories is intended to strike a balance and provide a set that is clearly defined, but measurable within the scope of this project. The order of the categories is consistent with the EMBC hierarchy of impacts: fatality, injury, critical facilities, lifelines, property damage, environment, economic, and social (EMBC, 2004)

[4] This is a widely-used definition and one applied and interpreted broadly for this framework. This category could include potential impacts to Indigenous communities, but those impacts may also transcend this category.

BC Risk Event Consequence Rating Scale

	Health		Social functioning		Cultural resources	Natural resources	Economic vitality		Cost to provincial government
	Loss of life	Morbidity, injury, disease, or hospitalization	Psychological impacts	Loss of social cohesion	Loss of cultural resources	Loss of natural resources	Loss of economic productivity	Loss of infrastructure services	
Catastrophic - 5	100+ people or >25% of a single community	1,000+ people affected or >25% of a single community	Widespread and severe disturbance resulting in long-term psychological impacts (e.g., post-traumatic stress disorder (PTSD))	Months-long disruption to daily life (e.g., inability to access employment, education) Widespread, permanent loss of livelihoods or way of life Severe, widespread erosion in public confidence in government Erosion of community institutions and community cohesion	Resource can never recover; destruction is permanent and irreversible (e.g., destruction of an irreplaceable artifact or knowledge)	Resource can never recover; destruction is permanent and irreversible (e.g., extinction of a species within the province)	Potential direct and indirect economic losses of over $1 billion* Long-term disruption or loss of an economic sector and associated job losses	Months-long disruption in infrastructure services Major impediment to day-to-day life	Added cost is far beyond Contingency Reserve Fund (i.e., > $1.5 billion)
Major - 4	10-100 people or > 15% of a single community	100-1000 people affected or > 15% of a single community	Localized severe disturbance resulting in long-term psychological impacts (e.g., loss of home, identity, or sense of place)	Weeks-long disruption to daily life (e.g., inability to access employment, education) Localized, permanent loss of livelihoods or way of life Moderate erosion of public trust in government or community cohesion	Recovery of the resource will take decades	Recovery of the resource will take decades	Potential direct and indirect economic losses of over $100 million* Months-long disruption to a major economic sector and associated job losses	Weeks-long disruption in infrastructure services Major impediment to day-to-day life	Significant added cost; up to 2x Contingency Reserve Fund amount (i.e., $750 million - 1.5 billion)

	Health		Social functioning		Cultural resources	Natural resources	Economic vitality		Cost to provincial government
	Loss of life	Morbidity, injury, disease, or hospitalization	Psychological impacts	Loss of social cohesion	Loss of cultural resources	Loss of natural resources	Loss of economic productivity	Loss of infrastructure services	
Moderate - 3	2-10 people or > 5% of a single community	10-100 people affected or > 5% of a single community	Widespread moderate disturbance resulting in temporary psychological impacts (e.g., feelings of fear and anxiety)	Days-long disruption to daily life (e.g., inability to access employment, education) Seasonal loss of livelihoods or way of life Minor erosion of public trust in government or community cohesion	Recovery of the resource will take years	Recovery of the resource will take years	Potential direct and indirect economic losses of over $10 million*; Weeks-long disruption to a major economic sector and employment	Days-long disruption in infrastructure services Major impediment to day-to-day life	Added costs can be covered within Contingency Reserve Fund but would detract from other priorities (e.g., >50% of Contingency Reserve Fund or > $375 million but < $750 million)
Minor - 2	Low potential for multiple loss of life	<10 people affected	Localized moderate disturbance resulting in temporary psychological impacts (e.g., feelings of fear and anxiety)	Hours-day-long disruption to daily life (e.g., inability to access employment, education) Low potential for erosion of public trust in government or community cohesion	Recovery of the resource will take months	Recovery of the resource will take months	Potential direct and indirect economic losses of over $1 million*; Days-long disruption to a major economic sector and employment	Hours-long disruption in infrastructure services	Added costs can be easily covered within Contingency Reserve Fund (≤$350 million)

	Health		Social functioning		Cultural resources	Natural resources	Economic vitality		Cost to provincial government
	Loss of life	Morbidity injury, disease or hospitalization	Psychological impacts	Loss of social cohesion	Loss of cultural resources	Loss of natural resources	Loss of economic productivity	Loss of infrastructure services	
Insignificant - 1	No possibility of loss of life other than through unforeseeable misadventure	No possibility for morbidity, injury, disease, or hospitalizations other than through unforeseeable misadventure	Minimal expected reactions of fear anxiety or disruption to daily life	Minimal disruption to daily life Trust in government remains unchanged	Little impact or resource can recover within days	Little impact or resource can recover within days	Potential direct and indirect economic losses less than $1 million*	Temporary nuisance	No expected additional costs to provincial government

*Chained 2007 dollars

*Based on an annual Contingency Reserve Fund of approximately $750 million (B.C. Ministry of Finance, 2018).

Consequence 1. Heat wave / dome			
Consequence Category		**Rating**	**Confidence**
Health	Loss of Life	2	Low
	Morbidity, injury, disease or hospitalization	3	Low
Social functioning	Psychological impacts	3	Low
	Loss of social cohesion	2	Low
Cultural resources	Loss of cultural resources	3	Low
Natural resources	Loss of natural resources (e.g., natural environment and ecosystem services)	3	Low
Economic vitality	Loss of economic productivity	2	Low
	Loss of infrastructure services	1	Low
Average Consequence Score		2.4	
Consequence 2. Severe coastal storm			
Consequence Category		**Rating**	**Confidence**
Health	Loss of Life	5	Low
	Morbidity, injury, disease or hospitalization	5	Low
Social functioning	Psychological impacts	5	Low
	Loss of social cohesion	5	Low
Cultural resources	Loss of cultural resources	5	Low
Natural resources	Loss of natural resources (e.g., natural environment and ecosystem services)	4	Low
Economic vitality	Loss of economic productivity	4	Low
	Loss of infrastructure services	4	Low
Average Consequence Score		4.6	
Consequence 3. Extreme precipitation and landslide			
Consequence Category		**Rating**	**Confidence**
Health	Loss of Life	2	Low
	Morbidity, injury, disease or hospitalization	2	Low
Social functioning	Psychological impacts	3	Low
	Loss of social cohesion	2	Low
Cultural resources	Loss of cultural resources	3	Low
Natural resources	Loss of natural resources (e.g., natural environment and ecosystem services)	3	Low
Economic vitality	Loss of economic productivity	4	Low

	Loss of infrastructure services	4	Low
	Average Consequence Score	**2.9**	

Consequence 4. Increased incidence of vector-borne disease			
Consequence Category		**Rating**	**Confidence**
Health	Loss of Life	3	Low
	Morbidity, injury, disease or hospitalization	3	Low
Social functioning	Psychological impacts	3	Low
	Loss of social cohesion	3	Low
Cultural resources	Loss of cultural resources	2	Low
Natural resources	Loss of natural resources (e.g., natural environment and ecosystem services)	3	Low
Economic vitality	Loss of economic productivity	2	Low
	Loss of infrastructure services	1	Low
Average Consequence Score		**2.5**	

Consequence 5. Rising Water temperature			
Consequence Category		**Rating**	**Confidence**
Health	Loss of Life	2	Low
	Morbidity, injury, disease or hospitalization	3	Low
Social functioning	Psychological impacts	4	Low
	Loss of social cohesion	3	Low
Cultural resources	Loss of cultural resources	4	Low
Natural resources	Loss of natural resources (e.g., natural environment and ecosystem services)	4	Low
Economic vitality	Loss of economic productivity	4	Low
	Loss of infrastructure services	3	Low
Average Consequence Score		2.9	

Consequence 6. Saltwater intrusion			
Consequence Category		**Rating**	**Confidence**
Health	Loss of Life	2	Low
	Morbidity, injury, disease or hospitalization	3	Low
Social functioning	Psychological impacts	4	Low
	Loss of social cohesion	3	Low
Cultural resources	Loss of cultural resources	4	Low
Natural resources	Loss of natural resources (e.g., natural environment and ecosystem services)	4	Low
Economic vitality	Loss of economic productivity	4	Low
	Loss of infrastructure services	3	Low
Average Consequence Score		2.9	

Consequence 7. Ocean acidification			
Consequence Category		**Rating**	**Confidence**
Health	Loss of Life	2	Low
	Morbidity, injury, disease or hospitalization	3	Low
Social functioning	Psychological impacts	4	Low
	Loss of social cohesion	3	Low
Cultural resources	Loss of cultural resources	4	Low
Natural resources	Loss of natural resources (e.g., natural environment and ecosystem services)	4	Low
Economic vitality	Loss of economic productivity	4	Low
	Loss of infrastructure services	3	Low
Average Consequence Score		2.9	

Consequence 8. Increase in Invasive Species			
Consequence Category		**Rating**	**Confidence**
Health	Loss of Life	1	Low
	Morbidity, injury, disease or hospitalization	3	Low
Social functioning	Psychological impacts	2	Low
	Loss of social cohesion	2	Low
Cultural resources	Loss of cultural resources	3	Low
Natural resources	Loss of natural resources (e.g., natural environment and ecosystem services)	3	Low
Economic vitality	Loss of economic productivity	3	Low
	Loss of infrastructure services	1	Low
Average Consequence Score		2.3	

Consequence 9. Catastrophic Winds			
Consequence Category		**Rating**	**Confidence**
Health	Loss of Life	2	Low
	Morbidity, injury, disease or hospitalization	2	Low
Social functioning	Psychological impacts	3	Low
	Loss of social cohesion	2	Low
Cultural resources	Loss of cultural resources	4	Low
Natural resources	Loss of natural resources (e.g., natural environment and ecosystem services)	3	Low
Economic vitality	Loss of economic productivity	4	Low
	Loss of infrastructure services	4	Low
Average Consequence Score		3	

10.Seasonal water shortage			
Consequence Category		**Rating**	**Confidence**
Health	Loss of Life	2	Low
	Morbidity, injury, disease or hospitalization	3	Low
Social functioning	Psychological impacts	3	Low
	Loss of social cohesion	2	Low
Cultural resources	Loss of cultural resources	3	Low
Natural resources	Loss of natural resources (e.g., natural environment and ecosystem services)	3	Low
Economic vitality	Loss of economic productivity	2	Low
	Loss of infrastructure services	1	Low
Average Consequence Score		2.4	

Consequence 11. Loss of forest resources (Yc)			
Consequence Category		**Rating**	**Confidence**
Health	Loss of Life	2	Low
	Morbidity, injury, disease or hospitalization	3	Low
Social functioning	Psychological impacts	3	Low
	Loss of social cohesion	2	Low
Cultural resources	Loss of cultural resources	3	Low
Natural resources	Loss of natural resources (e.g., natural environment and ecosystem services)	3	Low
Economic vitality	Loss of economic productivity	2	Low
	Loss of infrastructure services	1	Low
Average Consequence Score		4.6	

Consequence 12. Increase pest and disease			
Consequence Category		**Rating**	**Confidence**
Health	Loss of Life	1	Low
	Morbidity, injury, disease or hospitalization	3	Low
Social functioning	Psychological impacts	3	Low
	Loss of social cohesion	2	Low
Cultural resources	Loss of cultural resources	3	Low
Natural resources	Loss of natural resources (e.g., natural environment and ecosystem services)	3	Low
Economic vitality	Loss of economic productivity	3	Low
	Loss of infrastructure services	1	Low
Average Consequence Score		2.4	

Note, the confidence is rated as low in the initial assessment, as further data gathering will need to take place to rise confidence where possible.

Step 3 Evaluate Risks

Multiply the likelihood and average consequence score to compute a risk score and rating for each risk event:

Risk Event	Likelihood	Consequence	Risk Rating	
1.Heat wave / dome	3	2.4	7.2	Medium
2.Severe coastal storm	3	4.6	13.8	High
3.Extreme precipitation and landslide	3	2.9	8.7	Medium
4.Increased incidence of vector- borne disease	2	2.5	5	Low
5.Rising Water temperature	3	2.9	8.7	Medium
6.Saltwater intrusion	3	2.9	8.7	Medium
7.Ocean acidification	3	2.9	8.7	Medium
8.Increase in Invasive Species	3	2.3	6.9	Medium
9.Catastrophic Winds	4	2.9	12	High
10.Seasonal water Shortage	3	2.4	7.2	Medium
11.Loss of forest resources (Yc)	4	4.6	18.4	High
12.Increase pest and disease	4	2.4	9.6	Medium

Step 4 Identify & Evaluate Adequacy of Existing Risk Mitigations

Identification of existing preventative and risk mitigations that may affect the extent of the risk event impact:

- Non-existent
- Inadequate
- Adequate
- Robust
- Excessive

Existing Risk Mitigation Evaluation		
Mitigation	**Examples**	**Rating**
Many of the **HGLUO** Objectives are based on Ecosystem Based Management and therefore improve ecosystem resilience. For example, one objective is to have connectivity throughout HG in old growth seral stage. In order to achieve this goal, we need to have enhanced silviculture and stand tending treatments. Additionally, HGLUO requires landscape level management that results in small openings spread throughout landscape (which act as fire breaks), there are not large contiguous areas cut. Another example, at the watershed level it is very rare that green up surveys are conducted due to Equivalent Clearcut Area (ECA) limitations. Riparian retention levels and cultural resource management are other examples where additional retention levels increase ecosystem resilience	A number of research and pilot projects have been conducted as part of this strategy. ECA numbers are being monitored at 3 levels: sub-unit, watershed and sensitive watershed levels. For example, in sensitive watershed would never worry about GU (1% harvest/ year in sensitive watershed).	Robust

FSP commits Taan to the following actions: • Review with their logging and road construction contractors the Off Road Compressions-Ignition Engine Emission Regulations and when appropriate the On-Road Vehicle and Engine Emissions Regulations when replacing or retrofitting logging equipment, road equipment and logging trucks • Maintain the vehicles that the company owns and their employees operate to meet the On-Road Vehicle and Engine Emission Regulations 2004, and phase out any pre-2004 vehicles by 2019. • Reviewing emissions avoidance • Meet with the Provincial and Haida Nation governments to discuss monitoring pest infestations, invasive plants and windfall monitoring from endemic winds. Taan attempts to correlate new infestation outbreaks and endemic winds to Climate Change to develop a strategy for managing such occurrences	• CMS L2 training • Documented evidence of commitment to meet the on road vehicle and engine Emission Regulations include equipment tracking in FLEETIO program. Jeff can provide an example of this tracking if you like. Ages of equipment owned by Taan (i.e., pick up trucks nothing older than 2004). • Ongoing upgrading of camp and facilities to more efficient generators (e.g., Louise camp, fuel farm in Ferguson), as well as limited run time on Juskatla generator until replacement. Documented evidence – operational management meeting minutes however it should be noted these discussions/ decisions took place quite a while ago (i.e., approximately October 2019 through contractor CNR management of the camp at that time) and sales rep Frontier Power in determining	Adequate

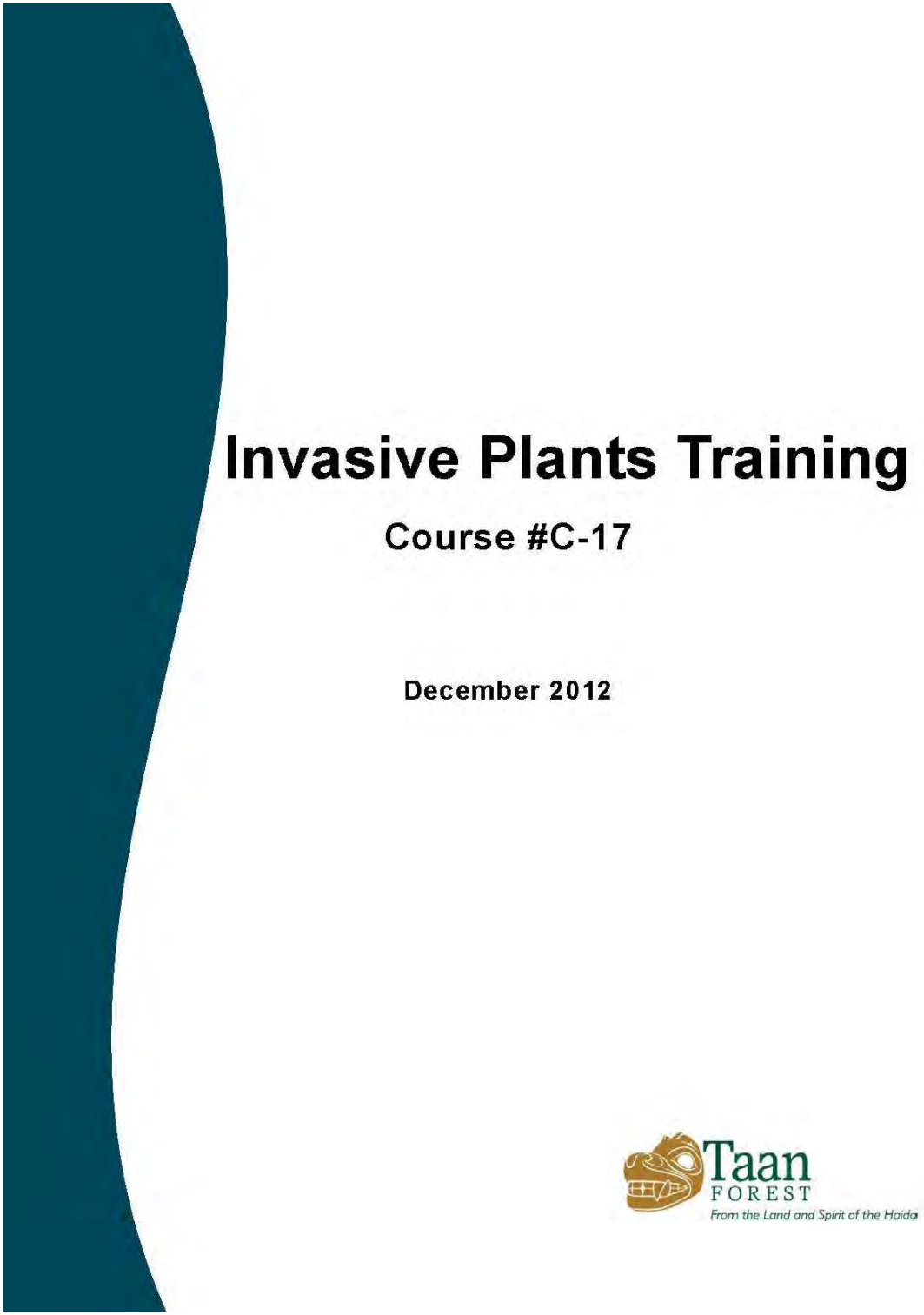
	efficient generator purchases (correspondence Oct. 2019 and Oct 2020).	
FSP Stocking standards incorporate climate change	Chief Foresters Standards for Seed Use which includes requirements on seedling range that are based on climate change research	Robust
Site planning	Invasive plants, windthrow assessment, management treatments and monitoring	Robust
Research and Technology	• Taan meets with and supports University of British Columbia (UBC) research team conduction Yellow Cedar dieback research program on Haida Gwaii • FESBC utilization/ carbon project to reduce waste left in burn piles, distribution of firewood to interested community members (e.g., block GEI003) • Ongoing UBC studies on GHG emissions on fertilizer emissions, initial results indicate we are seeing increased GHG emissions from wetter soils than drier soils. It appears the increase in temperature during heat wave, accelerated natural process	Robust
WCSIC membership	Taan has been in contact with the WCSIC to understand what resources are available to assist companies to complete the risk assessment and adaptation plan. It was noted, there has not been any work done by WCSIC to support climate change yet, however this is one of the items on the work plan so a toolkit of resources and references to some completed assessments by other parties is expected to be published in October.	Inadequate (to date)
SOP, Job Safety Breakdowns & Emergency Preparedness & Response Plans	• Incorporate emergency procedures for events such as wildfire, landslide, tsunami, flood, and other natural disasters • Safety Procedures for emergency events	Robust

Step 5 Identify gaps and action items

The following is a list of priority management follow up

1. Review Risk Assessment once WCSIC toolkit of resources and references is available.
2. Communication, input and coordination from management and higher level links to the Haida Gwaii and CHN objectives have not yet been fully incorporated.
3. Communication, input and coordination of mitigation efforts with other land managers and land owners.

Appendix P: Invasive Plants Training



species are often irreversible and, once established, invasive species are extremely difficult and costly to control

or eradicate.

The *Forest and Range Practices Act* (FRPA) and the associated *Forest Planning and Practices Regulation* (FPPR) require licensees to develop measures within their Forest Stewardship Plan (FSP) to prevent the introduction or spread of prescribed invasive plants as a result of primary forest activities (i.e., harvesting and road construction). The *Invasive Plant Regulation* (under FRPA) lists the prescribed species of invasive plants. This training package was designed to address the commitments made in the FSP related to training in identification and reporting of invasive plant species for appropriate personnel (e.g., Foresters, engineers, road maintenance contractors, etc.) for those species that are known to be present within or near the plan (FSP) area.

Identification & Management Considerations

The following pages include summaries of the high-priority plant species that are known to occur on Haida Gwaii and are included in the FSP. Photographs have been included to aid in identification, as well as key details of the species characteristics.

Management and treatment information has been provided for the main objective of planning appropriate methods and scheduling for conducting treatments in locations where invasive plants are known to occur. In all cases ensure the appropriate disposal of waste plants (i.e., landfill, bagged, burning) with all the plant materials being removed from the area.

Common Tansy *(Tanacetum vulgare)*




Special Features	Toxic leaves (contain neurotoxins, toxic oils, and the pesticide pyrethrin) that can be fatal if large quantities are consumed.
Location/Habitat	Shade intolerant and prefers well drained soils in low-mid elevations and are typically found in recently disturbed areas, roadsides and stream banks.
Reproduction/ Mechanism of Spread	Reproduce primarily by seeds. Seed is dispersed by birds, animals, and on vehicles that have been working in infested areas. Seeds can remain viable in the soil for up to 25 years.
Management	Ensure the prompt grass seeding of disturbed areas. Treat by hand pulling (before July to prevent seed spread) with yearly monitoring and retreatments as required. **Gloves and other protective clothing must be worn.**
Sources and Additional Information	Invasive Plant Council of BC http://www.bcinvasives.ca/publications/TIPS/Common_Tansy_TIPS.pdf A Guide to Weeds in BC http://www.weedsbc.ca/pdf/common_tansy.pdf

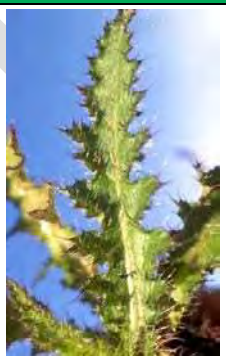
Gorse *(Ulex europaeus)*


Special Features	Looks like broom but has prickles that hurt. Can increase fire hazard as plants contain volatile oils and produce large amounts of litter. Gorse has a large taproot and extensive root system.

Location/Habitat	Shade intolerant and can be found in low elevation clearings such as sandy or rocky areas, roadsides, bluffs, cutblocks, and cutbanks. Known occurrences in the Skidegate area.
Reproduction/ Mechanism of Spread	Reproduce by seed that remain viable for up to 40 years. Seeds can be carried by water, animals, humans, machinery, and ants. It also aggressively reproduces vegetatively.
Management	To prevent spread, avoid creating disturbances in infested areas and ensure to wash equipment, clothing, and animals that have been in infested areas. Treatment options are limited to hoeing or digging up large plants or pulling seedlings. Several follow up treatments will be required. **Do not cut stems**, unless cutting before seed set (spring and autumn) and following up with an excavation treatment or if in a sensitive habitat.
Sources and Additional Information	Invasive Plant Council of BC http://www.bcinvasives.ca/publications/TIPS/Gorse_TIPS.pdf A Guide to Weeds in BC http://www.weedsbc.ca/pdf/gorse.pdf

Marsh Plume Thistle *(Cirsium palustre)*



Special Features	Can grow up to 1.5m tall.
Location/Habitat	Prefers moist to wet openings including riparian areas and disturbed habitats such as cutblocks and roadways. Can germinate under forest canopy if seepage present. Known colony in Alliford Bay.
Reproduction/ Mechanism of Spread	Produces by seeds that are spread by wind, water, and ingestion and deposit by birds.
Management	Ensure the prompt grass seeding of disturbed areas. Treat by hand pulling (before summer months to prevent seed spread) with yearly monitoring and re-treatments as required.
Sources and Additional Information	Invasive Plant Council of BC http://www.bcinvasives.ca/publications/TIPS/Marsh_Plume_Thistle_TIPS.pdf A Guide to Weeds in BC http://www.agf.gov.bc.ca/weedsbc/pdf/marsh_plume_thistle.pdf

Knotweeds

Japanese *(Polygonum cuspidatum)*	Himalayan *(Polygonum polystachyum)*






Special Features	Called 'Bamboo' given its appearance and hollow stems (Japanese). Stems of Himalayan are solid. Grows in tall dense thickets.
Location/Habitat	Found in freshly disturbed soils in roadside ditches or other areas with high soil moisture.
Reproduction/ Mechanism of Spread	Spreads rapidly vegetatively with rhizome systems that can extend up to 20m from the parent plant. Distributed by root and stem fragments that that are dispersed by human activities or by water to downstream areas.
Management	Ensure all vehicles, equipment and gear/clothing are free of plant parts. Take special care when controlling knotweed near streams, or ditch lines, to prevent the movement of plant parts downstream. Treat by mowing or cutting must be done close to the ground, twice per month between April and August, then monthly until the first frost. Repeat treatment for at least 5 years. Monitor area throughout the growing season to ensure new infestations do not develop from root fragments. Alternatively, stems can be cut and covered with heavy black plastic (5mm) following removal. A layer of mulch 10-12 inches on top of the plastic can help. The area must be monitored to ensure that any escaped shoots are promptly cut.
Sources and Additional Information	Invasive Plant Council of BC http://www.bcinvasives.ca/publications/TIPS/Knotweeds_TIPS.pdf

Hawkweeds

Meadow *(Hieracium pilosella)*	Orange *(Hieracium aurantiacum)*	Spotted *(Hieracium maculatum)*
  	  	  

Special Features	Spotted hawkweed can quickly colonize openings and are a major issue for agriculturalists. Leaves have characteristic purple spots.
Location/Habitat	Shade intolerant and commonly invade disturbed sites, including roadsides and clearings. They flourish in well-drained, coarse-textured soils.
Reproduction/ Mechanism of Spread	Reproduces through four mechanisms: (i) above-ground runners (called stolons), (ii) rhizomes, (iii) seed, and in some cases (iv) buds on the roots. Established populations expand in size primarily via stolons. Seeds spread by human activities, contaminated soil, wind and animals.
Management	Ensure the prompt grass seeding of disturbed areas. Treat by digging out, **do not pull**, plant and shallow roots (before summer to prevent seed spread) with yearly monitoring and re-treatments as required. Take care not to spread any of the vegetative parts of the plant as re-growth from roots, stolons and rhizomes can occur.
Sources and Additional Information	Invasive Plant Council of BC http://www.bcinvasives.ca/publications/TIPS/Invasive_Hawkweeds_TIPS.pdf

Scotch Broom *(Cytisus scoparius)*



Special Features	Yellow flowers grow along the length of the stem.
Location/Habitat	Shade intolerant and will invade all exposed, well drained areas of mineral soil. Due to its affinity for light-dominated disturbed areas, any disturbance activity, such as road construction near infested areas, can enhance the spread.
Reproduction/ Mechanism of Spread	Reproduces by seed and lateral bud growth. Mature plants can produce up to 3500 pods, each containing 5–12 seeds. Seed pods can "spit" seeds up to 5m away. Seeds can survive dormant in the soil for over 30 years. The majority of seeds are dispersed in contaminated soil carried on equipment and vehicles.
Management	Treat broom before it flowers (late winter, early spring) to prevent seed maturation. Remove by hand pulling smaller stems or cutting large stems below ground level. Try to remove all of the plant, ensuring no seeds are dropped, using minimal soil disturbance. Grass seed area immediately after treatment. Due to the enormous 'seed banking' and re-sprouting potential (stumps and roots), treatments may need to be repeated over a 3 to 5 year period.
Sources and Additional Information	Invasive Plant Council of BC http://www.bcinvasives.ca/publications/TIPS/111Scotch_Broom_TIPS.pdf

Tansy Ragwort *(Senecio jacobaea)*




Special Features	Contains alkaloids that are toxic to cattle, deer, pigs, horses, and goats.
Location/Habitat	Found on open, well drained disturbed sites and exposed soil on roadsides, vacant non-crop lands, and clearcuts.
Reproduction/ Mechanism of Spread	Reproduces mostly from seed, but regeneration of shoots can occur from crown buds, root fragments, and intact roots, especially if they have been disturbed or injured. Seeds remain viable in the soil for up to 15 years and will germinate if disturbed. The majority of the seed is deposited within 10m of the original infestation. Seeds may also be transported in soil carried on equipment and vehicles.

Management	Ensure the prompt grass seeding of disturbed areas. To treat, hand pull plants when soils are moist to ensure the entire root system is removed. Periodic re-treatment will be necessary. If plants are pulled before flowering (July-September) they can be left on site to decompose, otherwise they must be bagged and removed.
Sources and Additional Information	Invasive Plant Council of BC http://www.bcinvasives.ca/publications/TIPS/Tansy_Ragwort_TIPS.pdf A Guide to Weeds in BC http://www.weedsbc.ca/pdf/tansy_ragwort.pdf

Yellow Flag Iris *(Iris pseudacorus)*



Special Features	It is the only wet-footed yellow iris, so if you see a yellow iris growing in a pond, ditch or lake edge, it is the Yellow Flag Iris. This plant can give off a toxic resin that will irritate the skin.
Location/Habitat	Grows in wetlands, margins of water bodies, and tidal freshwater or brackish areas.
Reproduction/ Mechanism of Spread	It reproduces both by seed and vegetatively by fast spreading rhizomes.
Management	Small patches can be dug out, but try to remove as much of the matted root structure as possible. For larger patches, clip seed heads off in July to prevent further spread. **Ensure to wear long sleeves and gloves**.
Sources and Additional Information	Alberta Invasive Plants Council http://www.invasiveplants.ab.ca/Downloads/FS-YellowFlagIris.pdf

Bull Thistle *(Cirsium vulgare)*


Grows in most habitats, disturbed sites, roadsides and cutblocks.

Canada Thistle *(Cirsuim arvense)*


Grows in all habitats where there is exposed soil or disturbance.

Common Burdock *(Arctium minus)*


Low to mid-elevations on roadsides, stream banks, and disturbed habitats.

Purple Foxglove *(Digitalis purpurea)*	Oxeye Daisy *(Chrysanthemum leucanthemen)*
  	  
Leaves, flowers and seeds of this plant are all **poisonous** to humans and some animals and can be fatal if eaten.	Found in mesic to dry areas such as roadsides, waste areas, and forested areas within low to mid-elevations.

Information and Reporting

All observations of new occurrences of any of the plants shown above must be reported to the Northwest Invasive Plant Coordinator (NWIPC) within 30 days.
Reporting to the NWIPC can be completed in one of the three following ways:

1) Directly, via telephone at **1-888-WEEDSBC**
2) Through the Invasive Alien Plant Program (IAPP) Application
3) Through the Report-a-Weed Phone App

When a new occurrence of an invasive plant has been identified, ensure to collect the following information:

- UTM Coordinates: Zone, Easting and Northing
- Species
- Observation Date
- Area (m^2)
- Location: include details so that others can locate the population with ease
- Comments: such as photos taken, recent disturbances, etc.

Note: Regardless of the methods of reporting, ensure that the report is documented and filed within the Taan CMS.

Invasive Alien Plant Program Application

The IAPP Application, hosted by the FLNRO, is the database for invasive plants in BC. The application allows the entry, editing and querying of invasive plant information including: site details; invasive plant inventory information; planning; treatment methods and data; and monitoring data.
The IAPP Map Display module is an interactive mapping system that displays the data contained within the IAPP application. It shows the locations of all identified invasive plant occurrences in BC and can assist with identifying potential invasive species that may be present in your work area.

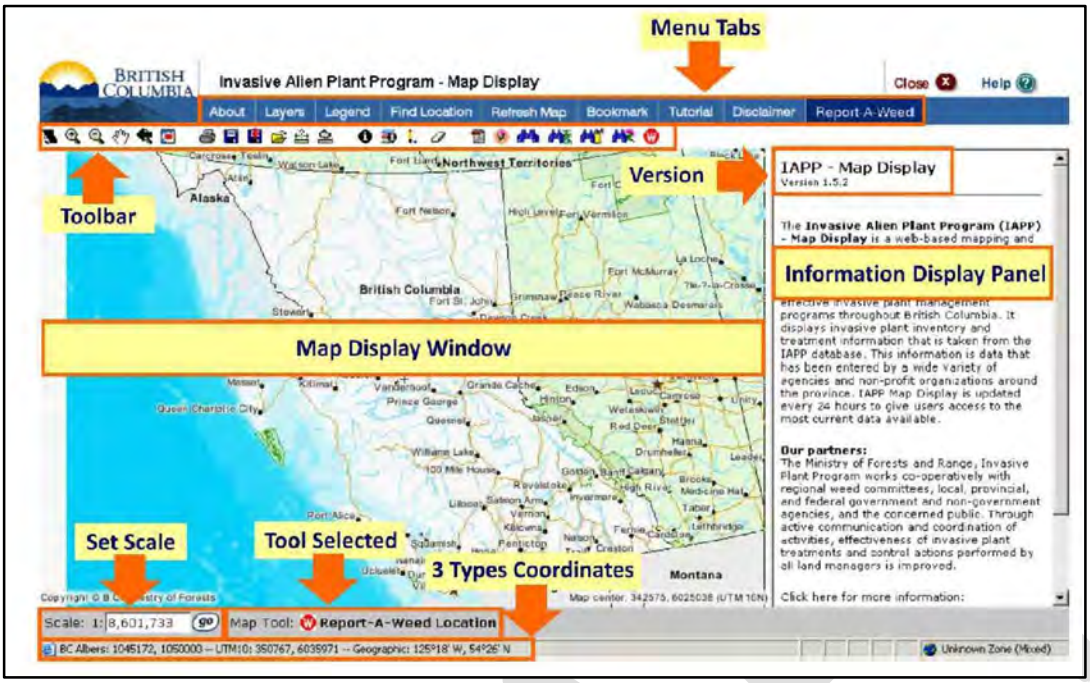


Figure 1: Example of the map display window in the IAPP Application.

For a more detailed tutorial on how to use the map display refer to the short exercise on the IAPP website: http://www.for.gov.bc.ca/hra/plants/application.htm

Report-a-Weed

Within the IAPP Application is the Report-a-Weed Wizard which is a 3 step process to report the locations of any new invasive plant occurrences. The report will be compared to known locations of the reported species in the IAPP application, and then it will be sent directly to the local Invasive Plant Management Area Contractor (IPMA).

Figure 2: Example of the map display window and the final step of the Report-a-Weed Wizard application.

For a more detailed tutorial on how to use the Report-a-Weed Wizard refer to the Report-a-Weed website: http://reportaweedbc.ca/downloads/RAWhandout.pdf

Note: *Purple Foxglove is not listed in the IAPP species database so any occurrences must be reported to the Northwest Invasive Plant Council at info@nwipc.org to be added to their records.*

Report-a-Weed Phone App

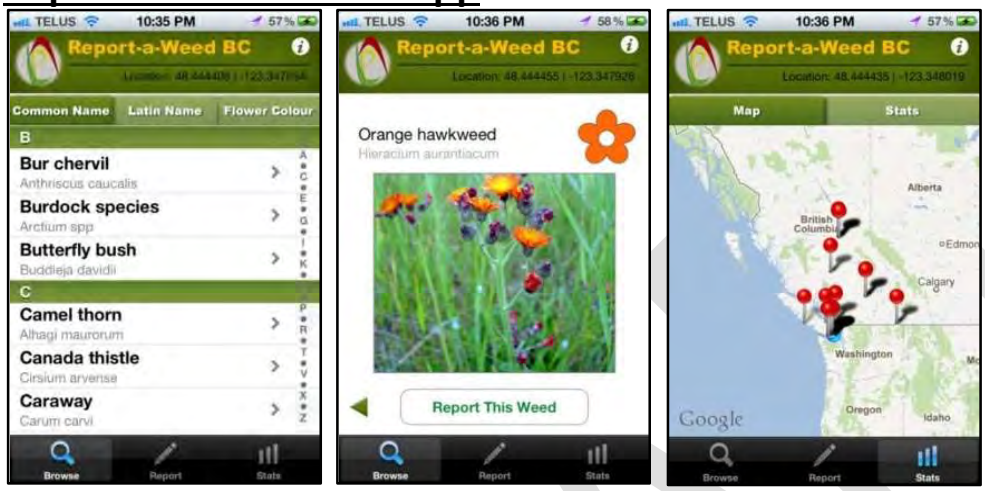


Figure 3: Example of the display windows in the Report-a-Weed phone app.

The newly developed mobile **Report-a-Weed BC** app is now available free of charge for iPhone and Android platforms. The app can be used on or off-line (report will be sent as soon as you are back in cell coverage) to create reports. The app also provides images of all the plant species on the IAPP list with mapped locations and statistics.

General Resources & Information Sources

- Invasive Alien Plant Program (IAPP) Application: http://www.for.gov.bc.ca/hra/plants/application.htm
- Invasive Plants Council of BC: http://www.bcinvasives.ca/
- Northwest Invasive Plant Council: http://www.nwipc.org/
- Report-a-Weed BC: http://reportaweedbc.ca/
- Targeted Invasive Plant Solutions info sheets: http://www.bcinvasives.ca/publications/TIPS/
- Weed Control Program, Ministry of Agriculture and Lands: http://www.al.gov.bc.ca/cropprot/weeds.htm
- Weeds BC: http://www.weedsbc.ca/

Appendix Q: Cultural Feature Identification Standards Manual

Council of the Haida Nation

Cultural Feature Identification

Standards Manual

Version 5.0

October 2019

Acknowledgments

The document benefited by the contributions or review of Allan Davidson, Tyler Bellis, Gwaai Edenshaw, Gerry Morigeau, Barbara Wilson, Stefan Winter, Nick Reynolds, Owen Jones, Simon Davies, Keith Moore as well as input from current CFI surveyors. Thanks to reviews for the monumental cedar standards by Guujaaw, Jim Hart, Gwaliga Hart, Jaalen Edenshaw, Tim Boyko, Laadaa, Shawn Cowpar, Sean Brennan, Dan Bellis, Christian White, Billy Bellis, Gitxgaa Wilson, and Vernon White.Thanks to the Kitasoo/Xai'xais for sharing Black Bear denning contributions (with contributions from Christina Service, Tony Hamilton, Grant MacHutchon and Wayne McCrory). Elements of these standards were first established by the Haida Heritage and Forest Guardians Haida Land Value Survey (HLVS) program over several years, which included contributions by both field crew and managers.

These standards have been developed by the Council of the Haida Nation to facilitate the protection of Haida values and for the implementation of the Haida Gwaii Land Use Objectives order.

Due to the nature of adaptive management, and 2007 adoption of Ecosystem Based Management principles on Haida Gwaii, it is expected that these standards will change over time. For any questions or clarifications on this document, please contact:

Heritage and Natural Resource Department Program Manager
Council of the Haida Nation
621 Loop Road, Old Massett
Haida Gwaii
V0T 1M0
250-626-6058

The Haida Nation is the rightful heir to Haida Gwaii.

Our culture, our heritage, is the child of respect and intimacy with the land and sea.

Like the forests, the roots of our people are intertwined such that the

greatest troubles cannot overcome us.

We owe our existence to Haida Gwaii.

The living generation accepts the responsibility to ensure that our

heritage is passed on to following generations.

On these islands our ancestors lived and died, and here too we will make

our homes until called away to join them in the great beyond.

– from the Constitution of the Haida Nation

Glossary of Terms

"**Black Bear Den**" means a cavity within a tree, a snag, a stump, or a log greater than 0.8m in diameter which shows evidence of use by black bears for winter hibernation;

"**Cultural Cedar Stand**" means three or more culturally modified trees, monumental cedar, or a combination thereof, where each tree is within 50 metres of another tree;

"Cultural Feature" means any Haida traditional forest feature, Haida traditional heritage feature, culturally modified tree or monumental cedar;

"Culturally Modified Tree" means, for the purposes of the HGLUOO, a tree that was modified prior to 1920 by Haida people as part of their cultural use;

"Development Area" means a specific location defined by boundaries shown on a site plan where timber harvesting is planned or carried out, and includes any stand level retention, management zones, reserve zones, mapped reserves or other areas where timber harvesting is restricted or managed;

"DBH" means diameter at breast height that is measured 1.3m from the Point Of Germination

"Feature Density Ranking" is a way of determining the applicable survey intensity (survey type) based on the occurrence of Cultural Features over a given area surveyed;

"**GPS**" means Global Positioning System;

"Monumental Cedar" means a visibly sound western red cedar or yellow-cedar tree that is greater than 100 centimetres in diameter at breast height and has a log length of 7 metres or longer above the flare with at least one face that is suitable for cultural use;

"Offsets" are strip-lines perpendicular to a survey centerline, also known as radial shots;

"POC" means Point of Commencement and is commonly used as a reference point in forest surveying;

"Strip-lines" are a series of survey transects than typically run parallel to one another;

"Tie-point" means a specific location, marked or identified, that can be used to locate a survey Point of Commencement or a point along a survey/transect;

"Traditional Heritage Feature" means a feature that is listed in Schedule 2 of the HGLUOO and requires special management measures as outlined in the HGLUOO;

"Traditional Forest Feature" means a feature that is listed in Schedule 2 of the HGLUOO and requires special management measures as outlined in the HGLUOO;

"Site Series" means a site capable of producing the same late seral or climax plant communities within a biogeoclimatic subzone or variant;

"UTM" means a Universal Transverse Mercator position format or units for determining geographic location;

"Western yew patch" means five or more Western yew trees where each yew tree is within 5 metres of another yew tree.

Purpose of this Document

This document specifies the field survey procedures that must be followed when a field assessment, referred to as a **Cultural Features Identification Survey**, is conducted to identify the presence of Cultural Features prior to approvals for road construction or timber harvesting on Haida Gwaii to meet the requirements of the **Haida Gwaii Land Use Objectives Order (HGLUOO)**.

The standards are designed to be used by a person who has been certified by the Council of the Haida Nation (CHN) to carry out such field assessments. A detailed knowledge of these standards, and their application in different field situations, is part of the training and certification of cultural feature surveyors. The standards are also designed for use by field staff of the Council of the Haida Nation in situations where field assessments of Cultural Features must be carried out by CHN staff.

These standards have been derived from survey techniques developed over a number of years by the CHN for Cultural Features Identification Surveys with forestry licensees on Haida Gwaii.

Background and the Connection to Higher Level Objectives

These standards for the identification of Cultural Features have been developed as a result of the **Strategic Land Use Agreement (SLUA)** and the subsequent Haida Gwaii Land Use Objectives Order. These two documents outline a series of objectives and required practices that form the basis for Ecosystem Based Management (EBM) on Haida Gwaii. The cultural sections of the HGLUOO prescribe a series of forest management requirements, including Cultural Feature Identification Surveys, to maintain and protect Haida Cultural Features that are negatively affected by logging, road construction and associated activities.

Use of the Standards

The standards establish the procedures that must be followed when an individual who is certified to carry out Cultural Features Identification Surveys, conducts the surveys that are required by the Haida Nation through the HGLUOO. The standards apply to surveys carried out in two different situations described in the HGLUOO.

First, the HGLUOO (Section 3) directs that Cultural Features must be identified, prior to logging or road construction, in **Development Areas** where these activities are planned to occur.

Second, the HGLUOO establishes **Cedar Stewardship Areas (CSA)** (Section 9 and Schedule 3*)* in order to help perpetuate a long term supply of cultural cedar for the Haida Nation. Logging in these areas is restricted, but there is a provision in the HGLUOO that up to 10% of the total area of the CSA may be removed for commercial development provided that certain requirements are met. One of the requirements before there can be any removal of trees from a CSA is that there must be a field assessment of Cultural Features in the CSA completed by a person who has been certified by the Council of the Haida Nation. Other Cultural Features that are not specifically identified in the HGLUOO, such as cedar recruitment and bark-stripping, are also being managed for in these Cedar Stewardship Areas. **For this reason, field staff of the Council of the Haida Nation will implement these standards to survey Cultural Features in the Cedar Stewardship Areas where removal of**

trees is proposed. CHN are also in the process of completing baseline inventories of cultural features, aquatic and wildlife habitat in CSAs.

Due to the nature of adaptive management it is expected that these standards will change over time.

1.0 Cultural Features

There are several broad types of **Cultural Features** that are described in this Standards Manual. These do not represent a full or absolute list of features integral to Haida culture. The listing of these features is specific to the HGLUOO and the management requirements for these features are set out in the Order. Under the HGLUOO, Cultural Features are identified in Sections 5, 6, 7, 8, and 18. These Cultural Features are:

- Haida Traditional Heritage Features;
- Haida Traditional Forest Features;
- Culturally Modified Trees;
- Monumental Cedar;
- Yew Trees;
- Bear Dens

For the purposes of cultural feature identification, individual Western yew trees and Western yew patches are also included in these standards. Objectives for Western yew retention are provided in Section 8 of the Order. Likewise, the identification of Black Bear dens (section 18 of the HGLUOO) are also included in these standards.

Each of these 6 types of Cultural Features are briefly described below. More detail on the identification of each is provided in Appendix D- Feature Identification.

Archaeological Impact Assessments

Identifying when an Archaeological Impact Assessment (AIA) is required is not the sole responsibility of a Cultural Feature Identification surveyor, but inevitably the responsibility of the practicing forester, or licensee who is planning the development and the CHN who are the holders of data on traditional habitation and use areas. However, cultural feature identification surveyors are often the first in an area, and as such need to be able to recognize when to call in
Archaeological professionals. Cultural Feature Identification surveys are equivalent to what the Provincial Heritage Branch may term a non-permitted Preliminary Field Reconnaissance and the application of these surveys does not negate a licensee's obligation to consult a professional archaeologist or comply with requirements under the Provincial *Heritage Conservation Act.* Resource management direction for a licensee can be further informed by a more detailed Archaeological Inventory Study or assessment by a professional archaeologist, resulting in a potential AIA. AIA's are detailed inventories conducted under permit from the Provincial Heritage Branch that can determine the presence and impact to both surface and sub-surface archaeological resources.

At a minimum, AIAs or the consultation of a professional archaeologist should be recommended within the Cultural Feature Identification report if any of the following describe a development area:

-
The development area or part of it is at or below 25 meters in elevation;
- Any Haida Traditional Heritage Features are found
- Any Culturally Modified Trees are found

- Where known development is planned to occur between at least two archaeological features (i.e. CMTs) that are within 100 meters of each other.
- Where the surveyor suspects a likelihood of subsurface features.
- Where archaeological evidence is documented in an adjacent area (*ex.* known traditional use site, village, camp, trail, or an area specifically identified in an Archaeological Overview Assessment).

Other variables may inform the need for an AIA, based upon the discretion of the CFI surveyor, practicing archaeologist, forester, the Council of the Haida Nation, or Provincial Heritage Branch.

While a Cultural Feature Identification survey may identify an archaeological resource, it is the responsibility of the proponent (e.x. Forest Company) to solicit the support of a registered professional archaeologist for any further assessments, and it is the responsibility of the archaeologist retained to prepare a report and to record the sites under the provincial archaeological site registry. This is the case for features both within and outside block boundaries, so that features will be made known and afforded legal protection.

1.1 Haida Traditional Heritage Features

There are two classes of Haida Traditional Heritage Features (HTHFs) described in Schedule 2 of the HGLUOO. Identification of any of these features during a survey necessitates an independent Archaeological Impact Assessment. Features are described in detail in Appendix D.

Class 1 Haida Traditional Heritage Features

- Village/ Seasonal Village
- Identified Oral History site
- Burial Site
- Inland Camp/ Camp
- Identified Spiritual site

Class 2 Haida Traditional Heritage Features

- Midden
- Bear trap
- Fish Weir
- Cave
- Petroglyph
- Lithic Production Site
- Trails
- Lookout Site
- Fort
- Cache
- Canoe run
- Shoreline Habitation Site
- Rock Shelters
- Karst Features

1.2 Haida Traditional Forest Features

There are two classes of Traditional Forest Features (HTFFs) described in Schedule 2 of the HGLUOO.

Class 1 Haida Traditional Forest Features

Class 1 HTFFs are plant species that have been identified as being extremely important to the Haida and particularly rare, because they were impacted by historical logging, are threatened by future logging and/or are threatened by introduced species. There are currently eleven species that are Class 1 HTFFs. Each individual

occurrence of these plants is treated as an HTFF regardless of density or distribution. Both Skidegate (S) and Massett (M) names are given.

- sk̲il taawaatllx̲aay (S), sk̲il taw (M), **False Ladyslipper / Fairy-slipper** (*Calypso bulbosa)*
- k'anhll (S), x̲aayuwaa hlk̲'a.aay (M), **Black hawthorn** (*Crataegus douglasii)*
- 7inhllng (S), stla k̲'iist'aa (M), **Northern riceroot** (*Fritillaria camschatcensis)*
- ts'iihllnjaaw (S), ts'iihlanjaaw (M), **Devil's club** (*Oplopanax horridus)*
- hlaayaa hlk̲'a7ii (S), hlaayaa hlk̲'a.aay (M), **Highbush-cranberry** (*Viburnum edule)*
- Narcissus anemone (Anemone narcissiflora var. villosissima)
- One-and-a-half flowered reedgrass (Calamagrostis sesquiflora)
- Hlunhit, hlunxid, Richardson's geranium (Geranium richardsonii)
- Wright's filmy fern (Hymenophyllum wrightii)
- Calder's lovage (Ligusticum caldera)
- Western cowbane (Oxypolis occidentalis)

Class 2 Haida Traditional Forest Features

Class 2 HTFFs are some plant species that have been identified as being of importance to the Haida, but may be either less rare or less threatened by logging and/or introduced species. Unlike Class 1 HTFFs where each individual occurrence is the equivalent of a feature (*i.e.* an individual Devil's club plant equals one feature), Class 2 HTFFs depend on the species and their density and/or distribution. Some Class 2 species may or may not be considered features when they are individual occurrences. For example, a single occurrence of Common Juniper is a Class 2 feature, but a single occurrence of a cloudberry or a stinging nettle is not a Class 2 feature. Other species are considered features when they occur in small groups or patches. This *classification* of Class 2 Traditional Forest Features is detailed in Appendix D- Feature Identification- for each of the 10 species listed in the Schedule.
The following 10 species are Class 2 HTFFs.

- **d**al(xil)-guhlahl (M), **Common Harebell** *(Campanula rotundifolia)*
- k̲aayda kax̲awaay (S), hlk̲'am.aal l (M), **Common Juniper** (*Juniperus communis*)
- k'anhl7l (S), k'ayanhla (M), **Pacific crabapple** (*Malus fusca)*
- xil gaaydllgins (S), xil giidlagang (M), **Yellow pond lily** (*Nuphar lutea)*
- galgun xil (S), gal.un hlk̲'a.aay (M), **Stink Currant** *(Ribes bracteosum)*
- gudga gi gayd (S), x̲aayuwaa (M), **Black swamp gooseberry** (*Ribes lacustre)*
- kaigigunlkai (S), k̲'iit'agwaandaa hlk̲'a.aay (M), **Trailing black currant** (*Ribes laxiflorum)*
- k̲'aax̲u ts'alaang.ga (S), k̲'a.àw ts'alaangaa xil (M), **Cloudberry** *(Rubus chamaemorus)*
- gudang.xaal (S), gudang.aal (M), **Stinging nettle** (*Urtica dioica)* gwaayk'yaa (S), gwaayk'aa (M), **Indian hellebore** (*Veratrum viride)*

1.3 Culturally Modified Trees

A Culturally Modified Tree (CMT) means, for the purposes of the HGLUOO, a tree that was modified prior to 1920 by Haida people as part of their cultural use. This is distinctly different than the definition of a CMT under the BC Heritage Conservation Act ([s.13(2)(d)(g)]), which only manages for a CMT that is older, or thought to be older than 1846. For the purposes of the HG LUOO, this locally relevant date was deemed necessary to define CMTs in the context of a heritage feature. By 1920, some of the most sacred elements of the Haida culture had been systematically outlawed, including the right to gather, give potlaches, speak the language or be governed

by traditional hereditary leadership. Legal and institutional pressures on Haida traditional social fabric helps to distinguish pre-1920 as a time where traditional practice was common and less criminalized. The value of CMTs is not determined or provisional to a date for the Haida. However, 1920 offers a local context for defining a heritage feature for the purpose of forest planning and management.
There are several types of CMT's; however, the most commonly found on Haida Gwaii are bark stripped trees, bark boards, CMT test holes, and occasionally a felled tree with the medial section missing (often for a canoe, house post, or totem pole). See Appendix D for further descriptions of these common CMT types.
General descriptions for the most common CMTs are outlined in Appendix D- Feature Identification. Otherwise, detailed descriptions for the identification of CMTs can be referenced in *A Handbook for the Identification and Recording of Culturally Modified Trees* (2001)[4].

1.4 Monumental Cedar

This section outlines the criteria for a tree being classified as a monumental cedar for the purposes of implementing Ecosystem Based Management on Haida Gwaii and addressing the requirements of Section 9 of the HGLUOO. The quality of wood required by carvers varies between individual artists and over time. As such the criteria outlined in this section are subject to change. For purposes of Ecosystem Based Management, the HGLUOO defines a monumental as:
"A visibly sound Western red cedar or yellow-cedar tree that is greater than 100 centimeters in diameter at breast height and has a log length of 7 meters or longer above the flare with at least one face that is suitable for cultural use."- Haida Gwaii Land Use Objectives Order, December 16, 2010.
Descriptions of visibly sound, log lengths, a face of a tree, and tolerances for defects are outlined in detail in Appendix D- Feature Identification.

1.5 Cultural Cedar Stands

Cultural Cedar Stands, for the purpose of Cultural Feature Identification, are defined in the HGLUOO as three or more culturally modified trees, monumental cedar, or a combination thereof, where each tree is within 50 meters of another tree.

1.6 Western Yew trees

Section 8 of the HGLUOO includes management measures to protect Western yew, but does not specify that a cultural feature survey identify western yew or Western yew patches. However; they are included in these standards because of their importance to Haida culture.

Western yew patches are defined in the HGLUOO as five or more western yew trees where each yew tree is within 5 meters of another yew tree.

For the purposes of Cultural Feature Identification surveys, **all western yew trees** (individuals and patches) must be identified to the standards outlined in this manual.

1.7 Black Bear Dens

[4] Resources Inventory Committee. 2001. A Handbook for the Identification and Recording of Culturally Modified Trees. Version 2.0. Archaeology Branch, B.C. Ministry of Small Business, Tourism and Culture, Victoria, B.C.

Section 18 of the HGLUOO includes management measures for Black Bear dens, but does not specify that a cultural feature survey identify dens. However; they are included in these standards because of their importance to Haida culture.

Black Bear dens are defined in the HGLUOO as "a cavity within a tree, a snag, a stump or a log, greater than 0.80 meters in diameter which shows evidence of use by Black Bears for winter hibernation."

Coastal black bears den in large old trees, logs and stumps, and are typically dry with small entrances for protection from other bears. Some dens are accessed by bears that climb the outside of trees to use "elevated" tree cavities. Coastal black bears do not use trees, rock overhangs, caves, or man-made structures such as metal culverts that are not dry, warm and secure. Additional security may be provided by snow, but snow cover is not essential. Dens are found in forests at all elevations.
See Appendix D section 1.8 for a description on the identification of Black Bear Dens.
The absence of immediate bear presence or sign of immediate bear use does not disqualify a site from being a bear den. Old dens that have been compromised due to tree damage or rot resulting in excessive moisture in the den may disqualify the den for future suitability.

All surveyors must have a certificate of completion for Black Bear Den identification training on Haida Gwaii. Training must be recognized by the Council of the Haida Nation. Surveyors have until June 30th, 2020 to provide proof of training to the Council of the Haida Nation.

2.0 Survey Methodology

Who can carry out a Cultural Features Identification Survey

To meet the requirements of the HGLUOO, Cultural Features Identification Surveys must be carried out by surveyors who are certified by the Council of the Haida Nation. Certified surveyors can direct the work of field crews who are not certified. However; the certified surveyor must take full responsibility for the quality of the survey and survey results.

The surveyors work will be audited on a regular basis by auditors accredited by the CHN.

Because Cedar Stewardship Areas (CSA) protect other Cultural Features that are not specifically identified in the HGLUOO, such as cedar recruitment and bark-stripping, any proposal to remove trees from a CSA requires a survey conducted by field staff of the Council of the Haida Nation and completion of an intergovernmental process (IGP).

Plan ahead (or encourage a forest licensee to) so that surveying can occur within the optimal time period between May 15th and September 31st when plants are most visible.

Survey Intensity

There are two (2) levels, or types of surveys:

- **Level 1 Survey** – Is a less intensive site level reconnaissance that involves visual inspection of at least 25%[5] of the Development Area or the stratified portions of a Development Area, but less than 100% of that area;

- **Level 2 Survey** – Is the most intensive site level survey that involves visual inspection of 100% of the Development Area, the stratified portions of a Development Area, or a CSA. Any proposal to remove trees from a CSA requires a Level 2 survey.

Surveys using minimum block coverage would only occur when an area has almost no features and the likelihood of identifying features is considered very low. An example may be a mid-slope, gently sloping, closed canopied, low to medium nutrient second growth hemlock/spruce stand at the back end of a watershed where historical surveys in adjacent stands have found none of the cultural features identified for protection under the Land Use Objectives Order. Surveying only 25% of an area would be considered risk-managing but acceptable to the surveyor given the stand type, geography, knowledge of the area and supporting information (such as a feature density calculation, and/or survey results from adjacent stands).

While the minimum block coverage must meet the survey level standards, the method of meeting that minimum block coverage is at the discretion of the surveyor. Correct feature identification and data collection, appropriate block coverage and accurate spatial location are the required outcomes of the survey. The surveyor may choose either of two survey methods to meet that goal: hand-traversing using compass, clinometer and chain, or; surveying with the use of differential GPS systems.

It is highly recommended that surveyors use strip-line transects when conducting a Cultural Features survey. Transects are assumed to provide a visual inspection of an average of 25 metres on each side of the survey centre line. Thus, the minimum 25% block coverage that is evenly distributed over the proposed Development Area can be accomplished by transects where the spacing between centre lines is 200 metres. A 100% coverage (Level 2) requires that the centre lines of transects are no more than 50 metres apart.

The intent of allowing two different survey types or levels is to match the concentration of survey effort with the potential concentration of Cultural Features. While minimum survey requirements are acceptable in some cases, it is always the responsibility of the surveyor to identify the cultural features within a development area.

All surveys begin as a Level 1. A Level 2 survey is required when:

- The Development Area is less than 5 hectares;
- The Development Area is below 25m elevation;
- Any Culturally Modified Trees are encountered;
- A Class 1 Traditional Forest Feature is encountered;
- Any Monumental Cedar is encountered;
- A Class 1 or 2 Traditional Heritage Feature is encountered;
- A feature density greater or equal to 0.5 per hectare averaged over 2 hectares is identified (see Section 2.3 for details on calculating feature density) for each strata in a Development Area. The qualifications for features are defined in Appendix D of this manual There is a proposal to remove trees from a CSA.

Other variables that lead to a change in survey type are at the discretion of the surveyor. **In the end, it is the surveyor's responsibility to ensure that Cultural Features are identified.** If there is any question that there is

[5] it is always the responsibility of the surveyor to identify the cultural features within a development area

a higher probability of feature occurrence based on site type/ecology, or where the survey does not meet or exceeds Level 1 criteria, then a Level 2 survey should be conducted. Surveyors are to document their reasons for selecting the final survey intensity.

When establishing a second strip-line and if in doubt about a survey intensity level, and a survey of 2 hectares (400m traverse) has not been completed, then use a Level 2 survey until such time as a feature density calculation can be made (see Section 2.3).

2.1 Level 1 Site Level Reconnaissance Survey

The objective of a Level 1 Survey is to identify Traditional Forest Features, Traditional Heritage Features, Monumental, Culturally Modified, Black Bear dens and Western yew trees by surveying only part of the Development Area so that a minimum coverage of at least 25%[6] of the Development Area, or 25% of the stratified portions of a Development Area can be met.

Data collection transects should not be more than 200 metres apart (i.e. 200 metres between survey center lines), unless other survey methods are used as part of other forest planning activities and meet the minimum block coverage under Section 2.4.

Increasing block coverage is at the discretion of the surveyor. The more features that are being identified generally indicate a higher probability of features throughout a block or block strata and should trigger tighter transect spacing or more block coverage (i.e. higher survey intensity), as illustrated in Figure 1.

Figure 1. Survey Intensity Level in relation to block coverage.

2.2 Level 2 Intensive Site Level Survey

[6] it is always the responsibility of the surveyor to identify the cultural features within a development area

The objective of a Level 2 survey is to identify Traditional Forest Features, Traditional Heritage Features, Western yew trees, Black Bear dens, Monumental and Culturally Modified Trees by visually surveying for these features in 100% of the Development Area, a stratified portion of a Development Area, or a CSA where the removal of trees is proposed. When the transect method is used, the maximum required spacing between centerlines is 50 meters. Some surveyors may cover 100% of a Development Area or CSA through other engineering or forest planning work. Transects are highly recommended and will be the method used to audit a block or block strata.

When transects are used, they are assumed to provide a visual inspection of an average of 25 metres on each side of a survey line. For areas where a Level 2 survey is required and a distance of 25 metres cannot be seen from a centre line, the distance between transect lines can either be reduced accordingly or a surveyor can leave a survey centre line to visually inspect the area, as shown in Figure 2 and 3.

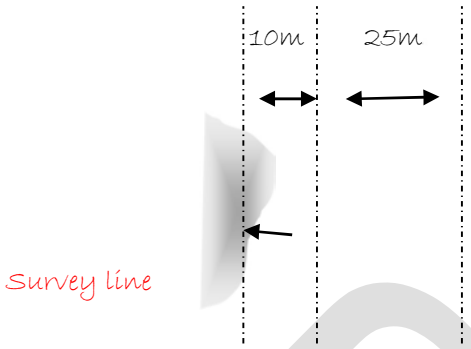


Figure 2. narrow grid spacing to account for poor visibility

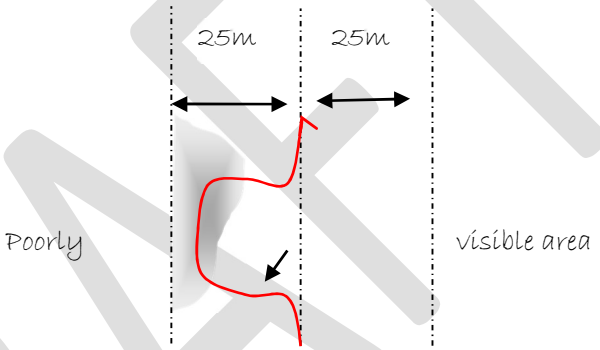


Figure3. survey off centre line to account for poor visibility

2.3 Calculating Feature Density

Feature Density is used to help determine what survey intensity should be applied in a Development Area or stratified portion of a Development Area (i.e. Level 1 or Level 2). Feature density is calculated by summing the weighted feature score (Figure 4) and dividing it over the area covered by the survey.

Feature type	Weighted feature score
Class 2 Traditional forest	
Western yew trees	0.5
Monumental cedar	1
Culturally Modified Tree	1

Traditional Heritage Feature[7]	2

Figure 4. Weighted feature scores for density calculations.

Example A

An initial survey of 600m in length and 50m in width (assuming 25m visibility on either side of a centerline) covers a 3 hectare area and 2 Traditional Forest Features (0.5 points each) are found along with 1 monumental (1 point): $\frac{(0.5 + 0.5) + (1)}{3} = 0.67$

The density would be

Example B

An intial survey of 800m in length and 50m in width (assuming 25m visibility on either side of a centerline) covers a 4 hectare area and 8 Traditional Forest Features (0.5 points each) are found along with 4 monumental (1 point each):

$$\frac{(0.5 \times 8) + (4 \times 1)}{4}$$

The density would be: = 2

Example A has a final Feature Density score of 0.67, therefore a Level 1- Reconnaissance Site Level survey is adequate for the site. Example B has a Feature Density score of 2, therefore a Level 2 Intensive Site Level survey is required.

2.4 Minimum Block Coverage

At least 25% of each Development area, or 25% of each stratified portion of a Development area must have an evenly distributed survey, unless a Level 2 survey is required to meet the criteria in Section 2.0 for a Level 2 survey. Any proposal to remove trees from a CSA requires a Level 2 survey – 100% coverage. Surveying only to minimum block coverage would only be used when an area has almost no features and the likelihood of identifying features is considered very low. **Note that it is always the responsibility of the surveyor to identify all the cultural features within a development area.** Surveying at an intensity less than 100% is sometimes appropriate (see section 2.1), but is a measured risk at the discretion of the surveyor following the protocols and guidelines

[7] To be aware of known Traditional Heritage Features a surveyor will need to engage with CHN's Heritage and Natural Resource Department.

outlined in this standards manual.

2.5 Block Stratification

Development Areas and CSAs may cover a variety of ecological site series. Each cultural feature can be strongly correlated with a Biogeoclimatic Ecosystem Classification (BEC) site series. Different site series or timber types may have higher concentrations of features and merit higher survey intensity. The type of survey can be divided (stratified) within a Development Area or CSA as long as the minimum block coverage is met. Block stratification is not mandatory, but may prove to be efficient.

Determining stratification in a Development Area or CSA is at the discretion of the surveyor. Preexisting divisions in the blocks can be used, for example: blocks may be divided by site series, terrain types (often following timber type or site series breaks); by Standard Units; or by forest inventory types. Data collection standards, outlined in this manual, require the surveyor to justify the stratification of a block. See Figure 5 for an example.

The survey type for each strata can be determined by calculating the Cultural Feature Density in each strata, or by meeting criteria outlined in Section 2.0.

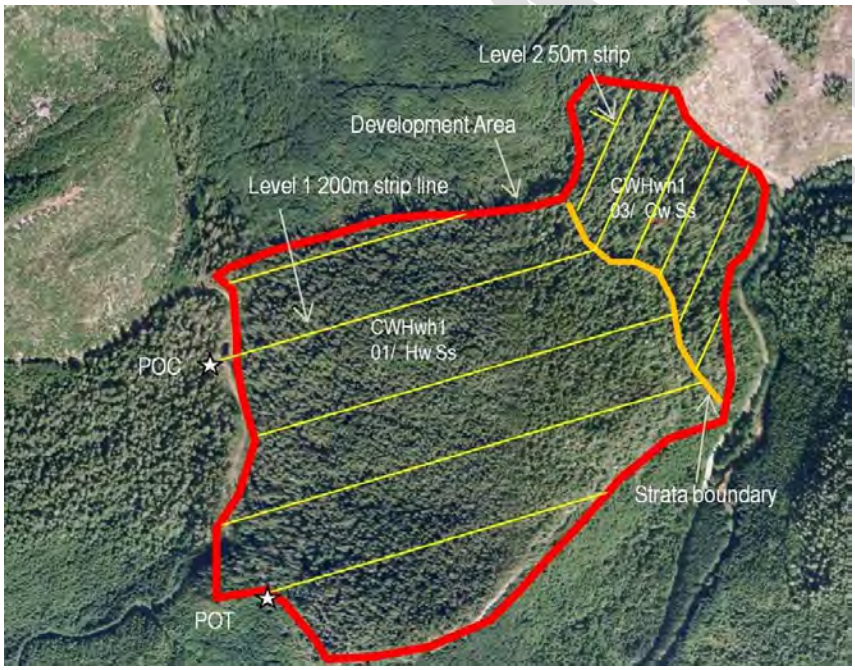


Figure 5. Block stratification example. In this case, the left or western most area, denoted by the 01 Site Series, is a Level 1 survey type and requires **less than** 100% block coverage. The right, or eastern most area, denoted by the 03 Site Series with a high concentration of Cultural Features, is a level 2 survey type and **requires 100%** block coverage.

3.0 Survey Establishment

This section outlines minimum standards and recommendations for establishing a cultural feature

identification survey. There are several techniques for conducting traversing and data collection that may be used through the course of forest engineering.
However, when cultural feature identification surveys are standalone surveys (not associated with other forestry engineering/planning), methods must follow either the hand-traversing protocols or the protocols for the use of differential GPS (DGPS) established in Sections 3 and 6 of this manual. Different quality assurance standards are outlined for each survey method. This section outlines whether each survey component is mandatory, or recommended.

3.1 Pre-field Assessment

The pre-field assessment of Development Areas and CSAs will help establish the survey type and block stratification needs. Pre-field assessments will also identify adjacency or inclusion of existing archaeological sites or known Cultural Features (CHN HNRD GIS Administrator has relevant data). The assessment may also include a review of available maps and data to determine proximities to coast or major water bodies, and potentiality of raised beach sites or karst features. In addition, the surveyor should also review technical data. Such data may or may not include information on timber type, elevations, mapped ecological site series, surveyed streams, gullies, rock outcrops or other operational scale features.

3.2 Tie-Points

A Cultural Feature Identification survey tie-point should be a permanent topographic feature distinguishable on air photos and on the ground. The tie-point can be a location like a creek junction, road location, or falling corner. Once identified, choose a healthy tree closest to this tie-point as the tie-point tree.

The tie-point or reference point of each transect should be well marked (*ex.* three strands of plastic flagging tape).

The tie-point is the navigation tool used by the surveyor to locate the Point of Commencement (POC). While the tie-point is an important point for survey establishment, it is not a required attribute for data submissions under these standards.

3.3 Point of Commencement (POC)

The point of commencement must be a map feature (creek, road junction, falling corner etc.) or GPS station, which is accessible and within or on the edge of the Development Area.

One POC must be used in the case of multiple openings (patches) in the Development Area. A POC is a required attribute for data submissions under these standards.

3.4 Strip-Lines

When hand-traversed transects are used, the strip-line must be run using compass, clinometric and metric surveyor tape (hip-chain) or electronic measuring devices.

Allowances for slope must be made since all distances must be horizontal. Strip-lines must run parallel or perpendicular to one another.

The strip-line should be marked with plastic marking tape so it is easily visible and at set distances (ex. 25m).

While strip-lines are recommended, they are not required if the survey method uses GPS.

3.5 Stations

Stations are fixed points with recorded co-ordinates (distance and bearing to a known location) along a strip-line. Stations are used to help a surveyor identify where they are along a strip-line transect.

For Cultural Features surveys, it is highly recommended that stations are marked throughout the survey, however stations are only **required** when a feature is present along a strip-line transect **and** when the survey method is hand-traversing. This allows a feature to be tied to a known reference point along the survey in the event that there are errors with the spatial location of the feature. The recommended spacing for stations is approximately 50 metres or less.

Stations that are the reference points for **offsets** (also called radial shots) that tie in a feature to a strip-line must be well marked (flagged with station information) (see the example in Figure 6 and 7).

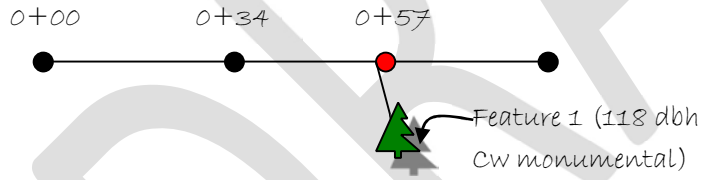


Figure 6. Tying in a feature (monumental in this case) with a station on a strip-line (ex. 0+057). Make sure to flag and mark the station information when hand-traversing.

Traverse Notes								easting (x)	northing (y)		
						start point		679000	5934200	Date 10/22/2010	Traverse
						N-S (cos)	E-W (sin)				
S.L	STA	Azimuth	SD	Slope%	HD	LAT	DEP	x	y	Comment	
1	0+00										
		92	34	15%	33.6	-1.2	33.6				
	0+33.6							679033.6	5934199		
		92	24	26%	23.2	-0.8	23.2				
1	0+56.8	~	~	OFFSET	~			679056.8	5934198	station for offset	
		177	17	23%	16.6	-17	0.9				
feature 1								679057.7	5934181	monumental cw 118 dbh	

Figure7. Example of station points along a strip-line in traverse notes. Note that X and Y coordinates are often calculated in the office using post-processing tools (such as RoadEng).

3.6 Offsets

Offsets, also known as radial shots, are lines used at the surveyor's discretion in order to either: a) extend the coverage of a survey to an area of a polygon to meet the minimum block coverage requirements, or b) to tie in identified features to a centerline. The offset bearing can be anything in relation to the centerline bearing, however are typically perpendicular to the centerline bearing.

3.7 Marking Features

3.7.1 **All monumentals, and CMT's must be marked with flagging tape so they are visible.** When flagging trees, if possible ensure that the flagging tape extends all the way around the feature (ex. entire circumference of a CMT or Monumental).

3.7.2 Class 1 or 2 Haida Traditional Forest Features and western yew features **must either be flagged in the field and/or mapped** according to spatial accuracy standards outlined in these standards (see section
6.5).

a) A banner flag[8] with the feature number is hung in the centre of the patch at all times
.

b) When patch features are flagged in the field, patch features must be flagged around the perimeter of the patch, while a geographic coordinate is taken from the centre of the patch. It is useful to have the feature number written on the flagging that delineates the outside of a patch.

c) Where mapping features instead of flagging the outside/perimeter of a patch, ensure mapping symbolizes the feature type and associated feature number. For patches with no outside flagging, mapping should include polygonal representation. An example of a circumstance where the outside of a patch is not flagged in the field but is mapped may be when a patch is found within a known reserve or no-harvest area and where detailed field delineation (for communication with harvesting crews) is not necessary.

3.7.3 Feature identification or their reference points, must be marked in the field in such a fashion so as to provide a reasonable level of identification to support the audit function. Flagging should, at minimum, note the feature type and associated feature number.
A development area boundary should never bisect a patch of features, rather an identified patch should be entirely within the boundary of a development area. For hand-traversing, bearings or 'shots' should be taken from the station to the central coordinate of the patch because a patch (or even a feature) can extend over a wide area.

[8] A banner flag is flagging that is horizontally hung between two trees or posts.

4.0 Data Gathering Standards

4.1 Data collection

The identification of Cultural Features requires the collection of a series of data that licensees must report to the Council of the Haida Nation and the Province of BC to meet reporting requirements established under the HGLUOO.

This section outlines both required and optional data to be gathered during a survey. A *Cultural Feature Identification Field tally sheet* is included in Appendix A. While this tally sheet contains the required and optional data fields the formatting of the tally sheet is provided as guidance. The tally sheet may be modified by the surveyor but the mandatory reporting fields must be filled in and the tally sheet content must be consistent with the attributes outlined in this section.

The mandatory and optional information is identified in Appendix A. Surveyors should document the reasons for decisions about survey intensity or methodology so that they are clear to subsequent auditors.

4.2 Minimum Reporting Requirements

Appendix C is a template that includes the minimum reporting requirements for a Cultural Feature Identification Survey once a survey has been completed in a Development Area. While **the data fields and report content are mandatory**, the reporting format is only a recommendation and may be modified by the surveyor.
All Cultural Feature Identification survey reports must be submitted to the Council of the Haida Nation's Heritage and Natural Resource Department upon completion. This information is necessary to monitor surveys for auditing purposes, and to contribute to general effectiveness monitoring for the management of cultural values. Having survey data and/or reports submitted as soon as they are completed allows for audits to occur prior to the development planning being complete or major road building or timber harvesting has commenced. Completed CFI survey reports must be submitted at least one month in advance of cutting permit (CP) and road permit (RP) applications being submitted to Front Counter Haida Gwaii.

4.3 Digital Spatial Data

The format for the submission of data collected in the field by a cultural feature surveyor to a license holder is made by agreement between the surveyor and the license holder. Digital spatial data in the form of a File Geodatabase feature classes, is a CHN requirement that Cultural Feature Identification surveyors must deliver, to facilitate our audit process. **Spatial locations (ex. UTMs) of features are a mandatory** responsibility of the CFI surveyor, and digital spatial data about cultural feature information must also be submitted annually by license holders to the CHN and the Province under the HGLUOO. If data is not submitted in the correct format a fee will be charged for processing of the data. File Geodatabase template available from the HNRD GIS Administrator.

5.0 Cultural Feature Identification Certification

Cultural Feature Identification certification is awarded by the Council of the Haida Nation based on competency, as proven through testing.

Training courses that cover the identification of cultural plants, monumental cedar, heritage features, culturally modified trees, survey standards and methodology, and Black Bear den identification will be offered through the Council of the Haida Nation (approximately 10-12 participants required). A prerequisite for challenging both the written and practical exams is that an individual must have successfully completed a course in Archaeological and CMT Inventory Training for Crew Members (administered by the BC Association of Professional Archaeologists) and the Black Bear den identification training. Certified surveyors shall participate in professional development courses, such as archaeological or monumental feature refresher training when hosted by the CHN (exemptions from professional development courses are only granted by the Heritage and Natural Resource Committee).

5.1 Testing

Testing for Cultural Feature Identification certification will include both a written (or oral) examination and a practical examination.

The passing grade for both examinations is 65%.

A passing grade in both the written (or oral) examination and the practical examination is required for certification. Examinations will focus on feature identification, feature classification and appropriate adherence to survey standards (survey intensity levels, stratification, data collection, reporting and accuracy).

5.2 Certification Timeline

Cultural Feature Identification certification is valid for 5 years from the date of issuance. Any surveyor who has not participated in a CFI survey for two consecutive years over the period of certification will have their certifications revoked. Re-certification requires a passing grade from a written (or oral) and practical examination or two successive audits classified as acceptable surveys (>65% score) during the final year of certification.

6.0 Quality Assurance and Auditing

Cultural Feature Identification Surveys carried out by certified surveyors are subject to audits to ensure standards are being met. This section outlines auditing standards and quality assurance standards.

6.1 Auditor Qualifications

Auditors will hold a valid Cultural Feature Identification certification from the Council of the Haida Nation. A CHN HNRD designated lead auditor is responsible for the final results of the audits.

6.2 Audit Frequency

Audits may be in two forms: spot checks or full audits.

6.2.1 Spot Checks: Spot checks are a low intensity, random reconnaissance type audit, whereby an auditor will review the quality of a Cultural Feature survey in accordance to the acceptable limits of error
(outlined in Section 6.5), prior to road building and timber harvesting. Spot checks will only occur for Development Areas where cultural feature surveys are being completed and may occur without the knowledge of the original surveyor. Field notes or data collected during the cultural feature survey may or may not be required to be given to an auditor. Random spot checks may lead to a full audit.

6.2.2 Full Audits: Full audits are comprehensive reviews of Cultural Feature survey areas, including data and report submissions, and are to be conducted prior to road building or timber harvesting. Choosing Development Areas that will have full audits will primarily be random, however non-random audits may occur based on the findings from spot checks.
The auditor reserves the right to identify a survey area boundary in the event that it is not identified or clarified by the original surveyor.
Stratified sampling will occur to ensure that the auditing of the surveyors will be proportionately divided among certified surveyors (probability proportional to size sampling). Audit efforts will also be distributed across tenure boundaries in proportion to the number of areas being developed by tenure holders. **Note that it is not the tenure holders or the Development Areas that are being audited, rather the work conducted by the surveyor that is being audited.**

Approximately 30% of CFI surveyors' development areas will be fully audited annually.

6.3 Audit Process

The following outlines the auditing process for full audits.

- Completion of Cultural Features identification survey in a given Development Area;
- Communication with Cultural Features surveyor regarding an audit for a specific Development Area;
- Appropriate data and/or report submissions given to auditor;
- Audit occurs prior to road building or timber harvesting;
- The full audit (not including spot checks) will be carried out and reported in a transparent and statistically defensible manner.
- When completed, audit reports will be submitted to the surveyor and the surveyor will be granted an opportunity to ask any questions for clarification;
- Any questions that arise, must be from the surveyor in question and not their organization or contract holder, this is to ensure the auditor/auditee relationship is not compromised by outside sources.

6.4 Audit Principles

The following summary outlines the general principles that guide the process for auditing cultural feature identification surveys:

- The CHN determines that the auditor has the necessary experience and knowledge to perform the audit.
- The auditor will take responsibility for the Cultural Feature survey by signing and dating the original data collection card and any subsequent changes they made to that data.
- The auditor will select plots to audit using a random or targeted process or by a process using best available information;
- The auditor will audit at least 30% of all surveys completed annually by a surveyor;
- At minimum, 20% of the surveyed development area, or 20% of each strata, will be audited based on a minimum of 3 random transects
- Targeted transects can be completed in addition to the 3 random transects.
- The auditor will notify the surveyor and licencee of the audit;
- A copy of the audit report will be provided to the surveyor;
- Feature identification or their reference points, must be marked in the field in such a fashion so as to provide a reasonable level of identification to support the audit function;
- Following the audit, surveyors will have an opportunity to revisit the development area with the audit team if they wish to review audit report results.

6.5 Acceptable Limits of Error

The following outlines the acceptable limits of error for a given survey:

a. **Block coverage**: At least 25% coverage of a Development Area or the stratified portions of a Development Area is surveyed.

b. **Spatial Accuracy**: Two types of surveys are recognized: hand-traversed surveys, or; surveys using Global Positioning System (GPS), preferentially a differential GPS system (DGPS). Spatial accuracy for all points should be within ± **10 metres** regardless of survey method. This is achievable using the following hand traversing or differential GPS protocols:

i. Protocols for the use of differential GPS

The GPS must store data, which can be differentially corrected and points must be fixed with the following minimum specifications /configurations for all static (point) surveys:

(Position Dilution of Precision) PDOP=	8
General DOP (only if PDOP is not available)=	10
Minimum of satellites	4
Degrees elevation angle	15
Signal to Noise Ratio (SNR) =	33

Minimum occupation time= 30 seconds

ii. Protocols for the hand traversing

Locating points using strip-lines and stations:

Horizontal distance = +/- 2%
Bearings= +/- 2 degrees

6.6 Failed audits

Should the result of the audit lead to a survey being classified below these standards then:

i. The surveyor may be asked to re-survey a Development area or areas; or,
ii. The auditor may recommend a higher proportion of non-random audits for that surveyor;
or,
iii. If multiple audits consistently indicate that the surveyor falls below the standards identified in this document, then the CHN may:
    i. Suspend a surveyor's certification for a specified period;
    ii. Place reasonable conditions on re-certification, such as identifying specific training or professional development; iii. revoke the surveyors' certification.

In addition to these data collection standards, reporting requirements will need to be consistent with standards provided in Appendix C.

6.7 Appealing an audit

Should a surveyor disagree with the results of an audit, a suspension or revocation, the certified surveyor in question may appeal the audit in the following way:

1. The **surveyor** informs the CHN of the disagreement or grievance by letter or email to the Manager of the Heritage and Natural Resource Department (P.O box 589, Masset BC V0T 1M0);
2. The Manager of the Heritage and Natural Resource Department (HNRD) informs the CHN's Heritage and Natural Resource Committee (CHN elected representatives);
3. If necessary, and upon the request of the surveyor (not a licensee), the manager of the HNRD organizes a field review to the development area in question. The field review will consist of the CFI surveyor, the CFI audit team, and a third party who has a valid CFI accreditation.
4. The results from the block review will be documented and forwarded by the third party to the CHN's HNRD Manager for review by the Heritage and Natural Resource Committee (HNRC) for deliberation.

5. The results from the HNRC will be communicated in a timely manner to the CFI surveyor.

6.8 Right to Revoke

The CHN retains the right to revoke certification if a surveyor consistently falls below the standards outlined in Section 6 of this document.

Appendix R: Field Tally Card

Cultural Feature Identification Field CHN Sheet v 1.0

Date dd/mm/yy | | | | | | |

Survey ID _____

Development area _____

Client _____

Hectares _____

Tie point info _____

_____

_____

Surveyor & Crew _____

Access point location _____

_____

Distance to PoC _____

Bearing to PoC _____

PoC Description _____

PoC UTM zone | | PoC Easting | | | | | | PoC Northing | | | | | | |

Traverse Type _____

Strata 1 Surv.Level ☐ Strata 2 Surv.Level ☐ Strata 3 Surv.Level ☐ Strata 4 Surv.Level ☐

Total Traverse _____

Navigation notes

Survey comments/borderline calls

Page 1 of ____

Appendix S: Field Tally Data Fields

Council of the Haida Nation Survey ID _____ Page __ of __

Survey comments

Strata no.									
Strip line									
Feature type: Feat no.									
Feature type: CMT									
Feature type: CLS1 HF									
Feature type: CLS2 HF									
Feature type: MON CLS1 FF									
Feature type: CLS2 FF									
Feature type: CLT STND									
Feature type: YW TREE									
Description									
DBH									
UTM Zone									
Easting									
Northing									

HEADER INFORMATION

1. **(Mandatory)** Date dd/mm/yy

2. **(Mandatory)** Development Area: name of the block or Development Area;

3. **(Mandatory)** Client: name of the licensee with FSP authorized by CHN and FLNRORD for cutting under the Forest Act and/or Forest and Range Practices Act;

4. **(Mandatory)** Hectares: area in hectares of the entire block or Development Area (including inblock reserves and retention areas);

5. **(Mandatory)** Surveyor and crew: the name of the surveyor certified by the Council of the Haida Nation as well as assisting field crew;

6. **(Optional)** Access point location: general description of the point of access. *Ex. North side, 4km Bragg main;*

7. **(Optional)** Tie Point Info: description of tie point. *Ex. Double flagged, yellow-25cm Hw.* Coordinates for tie point can be put under the Navigation Notes section;

8. **(Optional)** Dist to POC: distance in metres from the tie point to the Point of Commencement (POC);

9. **(Optional)** Bearing to POC: bearing from the tie point to the Point of Commencement;

10. **(Optional)** POC UTM Z: the UTM zone of the POC;

11. **(Mandatory)** POC easting: the UTM or BC Albers easting of the POC;

12. **(Mandatory)** POC northing: the UTM or BC Albers northing of the POC;

13. **(Mandatory)** POC description: description of the POC. *Ex. Triple flagged, red- 33cm Ss.*

14. **(Optional)** Navigation notes: General descriptions of access to the POC. *Ex. Creek crossing at 0+75m- go upstream 40m for log crossing;*

15. **(Mandatory)** Strata 1 Survey Level *to* Strata 4 survey level: the survey type per stratum identified in the block. Mark with either a *L1* or *L2;*

16. (**Mandatory)** Traverse Type: the method for surveying, either Hand Traversing or DGPS.

17. (**Mandatory)** Total traverse: The aggregate number of metres covered by all the strip-lines in the survey (sum all strata). The rule of thumb for determining hectares surveyed is 200m equals 1 hectare (assuming 25m visibility on both sides of centerline);

18. **(Optional)** Survey comments: Any survey comments or description of features (*ex.* Strip-line 1, Sta 0+99 (*or UTM/BC Albers*) = possible bear den).

FEATURE INFORMATION

1. **(Mandatory)** Strata No.: The number that represents the stratified portion of a block. Note that there may be as little as 1 strata for a block;

2. **(Optional)** Strip-line: The number that represents the strip-line on which the feature is located;

3. **(Mandatory)** Feat No.: The feature number. Begin at 00 for each block. Ensure that feature numbers are continuous across block strata;

4. **(Mandatory)** Feature types:

i. CMT: check □ if the feature is a Culturally Modified Tree. Acceptable attribute values to be entered under #5 *Description* include:

BS-T	Bark-stripped, tapered bark strip scars
BS-R	Bark-stripped, Rectangular bark strip scars
BS-G	Bark-stripped, Girdled bark strip scars
BS-O	Bark-stripped, Other bark strip scars
AL-T	Aboriginally Logged tree, Tested tree
AL-U	Aboriginally Logged tree, Undercut tree
AL-F	Aboriginally Logged tree, Felled tree
AL-S	Aboriginally Logged tree, Sectioned Tree
AL-N	Aboriginally Logged tree, Notched tree
AL-P	Aboriginally Logged tree, Planked tree
AL-C	Aboriginally Logged tree, Canoe tree
OM-P	Other Modified tree, Pitch Collection tree
OM-K	Other Modified tree, Kindling Collection tree
OM-D	Other Modified tree, Delimbed tree
OM-M	Other Modified tree, Message tree
OM-A	Other Modified tree, Arborglyph Tree
OM-G	Other Modified tree, Arborgraph Tree
OM-B	Other Modified tree, Blazed Tree
OM-S	Other Modified tree, Sap Collection Tree
OM-O	Other Modified tree, Other

ii. CLS1 HF: check ☐ if the feature is a Class 1 Heritage Feature: Acceptable attribute values to be entered under #5 *Description* include:

V/SV	Village/Seasonal Village
IC/C	Inland Camp/Camp
BS	Burial Site
IOHS	Identified Oral History Site
ISS	Identified Spiritual Site

iii. CLS2 HF: check ☐ if the feature is a Class 2 Heritage Feature: Acceptable attribute values to be entered under #5 *Description* include:

M	Midden
BT	Bear Trap
FW	Fish Weir
C	Cave
PG	Petroglyph
LPS	Lithic Production SIte
T	Trails
LS	Lookout Site
F	Fort
C	Cache
CR	Canoe Run
SHS	Shoreline Habitation Site
RS	Rock Shelters
KF	Karst Features

iv. MON: Check☐ if the feature is a Monumental cedar: Acceptable attribute values to be entered under #5 *Description* include:

CW	Western redcedar	Ts’uu
YC	Yellow cedar	Sgaahlan

v. CLS1 FF: check ☐ if the feature is a Class 1 Traditional Forest Feature: Acceptable attribute values to be entered under #5 *Description* include:

Fairy-slipper / False Ladyslipper	skil taawaatllxaay	skil taw
Black hawthorn	k'anhll	xaayuwaa hlk'a.aay
Northern riceroot	7inhllng	stla k'iist'aa
Devil's club	ts'iihllnjaaw	ts'iihlanjaaw
Highbush-cranberry	hlaayaa hlk'a7ii	hlaayaa hlk'a.aay

Narcissus anemone		
One and a half flowered reed grass		
Richardson's geranium	Hlunhit	hlunxid
Wright's filmy fern		
Calder's lovage		
Western cowbane		

vi. CLS2 FF: check ☐ if the feature is a Class 2 Traditional Forest Feature: Acceptable attribute values to be entered under #5 *Description* include the following:

Common harebell	dall(xil)-guhlahl	dall(-xil)-sgid
Common juniper	kaayda kaxawaay	hlk'am.aal
Pacific crab apple	k'anhl7l	k'ayanhla
Yellow pond-lily	xil gaaydllgins	xil giidlagang
Stink currant	galgun xil	gal.un hlk'a.aay
Black swamp gooseberry	gudga gi gayd	xaayuwaa
Trailing black currant	kaigigunlkai	k'iit'agwaandaa hlk'a.aay
Cloudberry	k'aaxu ts'alaang.ga	k'a.àw ts'alaangaa xil
Stinging nettle	gudang.xaal	gudang.aal
Indian hellebore	gwaayk'yaa	gwaayk'aa

vii. CLT STND: check ☐ if the feature is a CMT or Monumental cedar and is part of a Cultural Cedar Stand. Acceptable attribute values to be entered under #5 *Description* include:

01-99	The Cultural Stand Number

AND

CW	Western redcedar
YC	Yellow cedar

Example entry in the #5 *Description*:

01 CW

viii. YW TREE: check ☐ if the feature is a Western yew tree or patch. Acceptable attribute values to be entered under #5 *Description* include:

01-99	The number of individual stems in the patch

5. **(Mandatory)** Description: Fill out the descriptor for the feature, as defined in the previous section 4 (i-ix);

6. **(Mandatory)** DBH: Diameter at breast height. This field is only filled out for the Monumental and CMT features (Where applicable). Note that there are different management objectives for monumental trees greater than (>) 120 cm DBH, therefore care must be taken to ensure accurate measurements;

7. **(Optional)** UTM Zone: Enter the Universal Transverse Mercator zone;

8. **(Mandatory)** Easting: Enter the UTM/BC Albers easting;

9. **(Mandatory)** Northing: Enter the UTM/BC Albers northing.

Appendix T: Required Reporting Information

Surveyors are to contact CHN HNRD GIS Administrator to find out if there are known HTHF's in the development area prior to CFI survey.

Cultural Feature Identification Report _____ Report number ___ ___

General Location (*watershed*) _____

Block/Development Area name _____

Surveyor name _____

Crew names _____
_____
_____

Block hectares ___ ___

Survey start date ___ / ___ / ___ (mm/dd/yy)

Survey end date ___ / ___ / ___ (mm/dd/yy)

Total Traverse (m) ___ ___ ___ ___

Percent surveyed (%) ___ ___

Survey level by stratum

Strata no	Survey level (1 or2)	Strata description	Traverse (m)	Area (hectares)

Survey comments

Page __ of __

Feature report

Feat no.	Feature type	Description	DBH	UTM Zone	Easting	Northing	Strata

I certify that the identification of cultural features was completed to the Standards set out by the Council of the Haida Nation:

_____ (signature)

In the *Feature Type* column of the report, make sure to sort features by type. For example, record all the monumental cedars in a group (ex. features #1 through #6).

Appendix U: Feature Identification

Traditional Cultural Features identified in this section of the manual do not represent a full or absolute list of features used in the Haida culture. The listing of these features is specific to the Haida Gwaii Land Use Objectives Order (HGLUOO) as it describes criteria for the management of these values.

1.1 Traditional Heritage Features

People who are certified to conduct Cultural Feature Identification surveys have access to cultural data or requests for access through the Remote Access to Archaeological Data (RAAD) and through the Council of the Haida Nation's Heritage and Natural Resource Department.

There are two classes of Traditional Heritage Features identified in Schedule 2 of the HGLUOO.

Class 1 Traditional Heritage Features

Village/Seasonal village – nearly every headland and waterway that meets the ocean have these important habitation/heritage sites on Haida Gwaii.

Inland Camp/Camp- important sites used for travel, hunting, fishing, and harvesting. These sites may be associated with lakeshores, rivers, rock shelters, and inland places of work.

Burial Site- may include a mortuary pole- a carved pole with a hollow at the top where a box containing human remains were placed, or; tree burial (box or platform holding human remains that is placed in a tree), or; rock shelter/cave, or; internments.

Identified Oral History site- identified through oral tradition and ethnography as significant historical cultural sites throughout Haida Gwaii.

Identified Spiritual site- Areas of spiritual significance to the Haida, as identified through current practice, oral tradition and ethnography.

Class 2 Traditional Heritage Features

Bear Trap- a baited trap used to catch bears. A log was set to fall on the game when the bait was taken, often weighted with large rocks to increase the force. Indicators include a pile of large cobbles or boulders, possibly stumps of frame or post molds. Also could include pitfall traps: a hole up to 3m deep used to capture bear. Sharpened sticks may have been placed in bottom, often placed alongside a fallen tree so that when an animal jumps over the log it falls in the hole. While rope snares were also used, their identification in the field is difficult due to material decomposition. Traditional knowledge and ethnographic histories indicate that bear traps were historically commonly found on Haida Gwaii.

Fish Weir- a fishing device built in shallow estuaries, rivers, and streams consisting of a barrier of rocks or wooden stakes which allows water to pass through but directs the movement of fish. Indicators include short wooden stake knobs that often remain blackened where air has come in contact with them. Located in rivers, streams or seeping freshwater at coastlines. Can occur several kilometres upstream from the mouth.

Cave - a physical feature of natural origin utilized on a temporary or permanent basis for shelter or other significant social or ceremonial purposes. Caves were used for habitation as well as for burials, storage, etc. The living space of caves included the area in front of and outside the caves. Caves often contain very fragile material. Indicators include hearths, cultural material including lithics, fire cracked rock, faunal remains. Perishable materials such as basketry, ropes, adzed wood chips etc. may be preserved in dry caves.

Petroglyph- Symbols or designs pecked, carved or incised on rock surfaces. Found on boulders or bedrock in the intertidal zone; also found on relatively smooth rock outcrops.

Lithic Production Site- These are commonly surface sites. Lithics are stone objects that either include flakes as waste products formed while manufacturing a tool, may have been sharpened for use as a tool, or may have been used as is for cutting or scraping. Indicators include stones or tools that have been culturally altered, flake scards, points of percussion and sharp, thin edges. A quarry is a source of lithic materials from which the rock must be dug or cut, usually for geological properties such as basalt for stone tools (such as obsidian), ochre sources for painting, or argillite for carving. Associated with rock outcrops, boulders or rocky floats left by glaciers. Indicators include lots of lithic material, formed tools, and rounded rocks that may have been used as hammerstones.

Trail- Often marked with blazes, CMTs; exposed and compacted soil; and will often follow natural features such as rivers, valleys or alpine ridges.

Lookout Site- A prominent view point used continuously over time for travel, hunting or defensive purposes. Often associated with a point of topographic high relief such as a hill or ridge top.

Fort – A defensive structure usually located on islands with steep sides or high hills along shorelines; areas easily defendable. Used principally as defense locations, or used for everyday activities, such as drying fish and planting gardens, given they were commonly located in wind and sun exposed locations.

Cache – Most often a subsurface feature, described as a pit in which food, equipment, etc. was placed for safekeeping; often circular but also square or rectangular. Soil stratigraphy differs from surrounding soils. Indicators are burnt bark at bottom. Unlikely to have artifacts or ash, but are likely to be rich in other information such as pollen or seeds (requires a special expertise and is important not to disturb unnecessarily).

Canoe Run- A type of petroform where a strip of beach is cleared of stones so that the hulls of canoes are not damaged when hauled onto the beach. Usually in a sheltered or semi-

sheltered location. Canoe runs can also be associated with canoe skids: a series of large sticks or planks laid parallel to the beach and held in place with stakes. These are seen as parallel lines of wooden stakes running between high and low tide lines.

Shoreline Habitation Site- Includes raised beach sites, which may be located several kilometers inland at major drainages and are very vulnerable to forestry and road construction activities. The potential for raised beach sites at locations at and below 25m above sea level (asl) on Haida Gwaii is significant, particularly adjacent to ancient marine bays, estuaries or creeks. LiDAR is a useful tool to identify possible shoreline habitation sites.

Karst Feature- This feature is made up of carbonate bedrock (limestone). These soluble rocks are associated with subterranean cave systems, sink holes (doleans), fragile soils and unique ecosystems. These physical features are associated with high potential habitation sites, utilized on a temporary or permanent basis for shelter or other significant social or ceremonial activity. These sites also often contain important paleontological remains that inform the cultural and natural heritage of Haida Gwaii.

Midden: One of the most common archaeological site types. May be either subsurface or surface features that are not necessarily located beside the ocean (paleo/raised beach and paleo shoreline habitation sites). Indicators include dark soil, marine shells, mammal bone, fire-cracked rock, charcoal, and artifacts. Commonly associated with village sites (seasonal and permanent), there are several ways to identify a midden: the most common way is to visually inspect the roots of a tree throw/blowdown, and exposures.
Middens may include shell-free deposits, which can be identified by the color and texture of soil (are commonly dark and greasy/silty), and occasionally associated with fire cracked rock.

Rock Shelter: Usually a rock overhang large enough to be used for shelter, or ceremonial purposes such as burials. Commonly associated features can include visible stone tool debitage, animal bones used as tools, occasionally a hearth feature is visible, and occasionally a bentwood box, etc.

1.2. Traditional Forest Features

There are two classes of Traditional Forest Features identified in Schedule 2 of the HGLUOO.

1.2.1 Class 1 Traditional Forest Features (HTFFs)

Class 1 HTFFs are plant species that have been identified as being particularly rare, threatened by logging or introduced species as well as being extremely important to the Haida. The following lists the species that are Class 1 HTFFs. Each individual occurrence of these plants is treated as a feature regardless of density or distribution.

- sk̲il taawaatll̲xaay (S), sk̲il taw (M), **Fairy-slipper / False Ladyslipper** (*Calypso bulbosa)*
- k'anhll (S), x̲aayuwaa hlk̲'a.aay (M), **Black hawthorn** (*Crataegus douglasii)*
- 7inhllng (S), stla k̲'iist'aa (M), **Northern riceroot** (*Fritillaria camschatcensis)*
- ts'iihllnjaaw (S), ts'iihlanjaaw (M), **Devil's club** (*Oplopanax horridus)*

- hlaayaa hlk̲'a7ii (S), hlaayaa hlk̲'a.aay (M), **Highbush-cranberry** (*Viburnum edule)*

- Narcissus anemone (Anemone narcissiflora var. villosissima)
- One-and-a-half flowered reedgrass (Calamagrostis sesquiflora)
- Richardson's geranium (Geranium richardsonii)
- Wright's filmy fern (Hymenophyllum wrightii)
- Calder's lovage (Ligusticum caldera)
- Western cowbane (Oxypolis occidentalis)

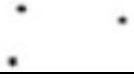
Groups of features for **fairy slippers**, **northern riceroot** or **devil's club** can be recorded as a patch when the density is greater than 5 plants /m^2 or when few to several sporadically occurring individuals occur and the distance between plants are less than or up to approximately 20 metres (figure 8, distribution code 2). In these cases, patches can be recorded with a single spatial coordinate. See section 3.7 for feature *marking* standards.

1.2.2 Class 2 Traditional Forest Features

Class 2 HTFFs are plant species that have been identified as being of importance to the Haida, but may be either less rare or less threatened by logging. Unlike Class 1 HTFFs where an occurrence is the equivalent of a feature (*i.e.* an individual Devil's club equals one feature), a Class 2 feature can be comprised of more than one individual occurrence, depending on the species and their density and/or distribution. This has been done to reflect the difficulty of surveying for certain plant species, the impractical nature of collecting data on individual plants, and to account for the general abundance of some species. Figure 8 outlines the types of plant distribution used to help classify Class 2 HTFFs.

For the purposes of retaining 50% of class 2 Haida Traditional Forest Features and to simplify harvest layout, surveyors will strive to balance the numbers of features in patches, providing the opportunity for a reasonable equality of plants both inside and outside harvest areas.

In all cases, patches can be *recorded* with a single spatial coordinate. See section 3.7 for feature *marking* standards.

Distribution Codes		
Code	Image	Description
1		Individual, a single occurrence
2		Few sporadically occurring individuals

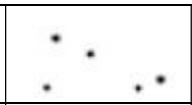
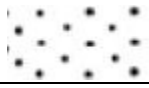
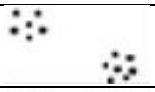
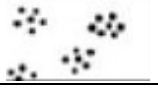
3		Several sporadically occurring individuals
4		Continuous uniform occurrence of wellspaced individuals
5		Single patch or clump of a species
6		A few patches or clumps of a species
7		Several well-spaced patches or clumps

Figure 8. Distribution codes used for identifying a feature.

Class 2 Traditional Forest Feature Species and their Classification as a Feature

The following 10 species are listed as Class 2 Traditional Forest Features in the HGLUOO *Schedule 2.* This section gives the name of the HTFF species and the criteria for their feature classification. Note that (S) and (M) denotes the Haida names in both Skidegate and Massett.

Name: dall(-xil)-sgid (M), dall (-xil)-guhlahl (S), **Common Harebell** *(Campanula rotundifolia)*

Feature Classification: A patch is considered a feature. Few to several sporadically occurring individuals (figure 8, distribution codes 2 and 3) where the distance between plants are less than 20 metres, is considered a patch.

A patch (distribution code 5) is also where the density is greater than 5 plants /m^2. Individual occurrences are not considered a feature.

Name: kaayda kaxawaay (S), hlk'am.aal I (M), **Common Juniper** (Juniperus communis)

Feature Classification: Individual occurrences and patches are considered a feature. Few to several sporadically occurring individuals (figure 8, distribution codes 2 and 3) where the distance between plants may be less than or up to approximately 20 metres are considered a patch (see figure 9 and 10). In other words, as long as the features are within 20 metres of each other, the patch size is at the discretion of the surveyor.

Name: k'anhl7l (S), k'ayanhla (M), **Pacific crabapple** (*Malus fusca)*

Feature Classification: A patch (distribution code 5) is considered a feature.

Few to several sporadically occurring individuals can be considered a patch where the distance between each crabapple tree may be less than or up to approximately 20 metres. In other words, as long as the stems are within 20 metres of each other, the patch size is at the discretion of the surveyor.
Patches should be recorded in the following groupings:

5-10 stems

11-20 stems
21-30 stems
31-50 stems
> 50 stems

Individual occurrences are not considered a feature.

Name: xil gaaydllgins (S), xil giidlagang (M), **Yellow pond lily** (*Nuphar lutea)*

Feature Classification: Any occurrence of this plant (regardless of density and distribution) is considered a feature.

Name: gal.un hlk̲'a.aay (M), galgun xil (S), **Stink Currant** *(Ribes bracteosum)*

Feature Classification: Any occurrence of this plant (regardless of density and distribution) is considered a feature. A patch (figure 8, distribution code 5) is where the density is greater than 5 plants /m^2. Few to several sporadically occurring individuals where the distance between plants are less than or up to approximately 20 metres is also considered a patch.

Name:gudga gi gayd (S), x̲aayuwaa (M), **Black swamp gooseberry** (*Ribes lacustre)*

Feature Classification: Any occurrence of this plant (regardless of density and distribution) is considered a feature. Few to several sporadically occurring individuals where the distance between plants are less than 20 metres, are considered a patch.

A patch, (figure 8, distribution code 5) is also where the density is greater than 5 plants /m^2.

Name: kaigigunlkai (S), k̲'iit'agwaandaa hlk̲'a.aay (M), **Trailing currant** (*Ribes laxiflorum)*

Feature Classification: Individual occurrences and patches are considered a feature. A patch (figure 8, distribution code 5) is where the density is greater than 5 plants /m^2 .

Few to several sporadically occurring individuals where the distance between plants are less than or up to approximately20 metres, is considered a patch.

Name: k̲'aax̲u ts'alaang.ga (S), k̲'a.àw ts'alaangaa xil (M), **Cloudberry** *(Rubus chamaemorus)*

Feature Classification: Individual occurrences are not considered a feature.

A patch (figure 8, distribution code 5) where the density is greater than 5 plants /m^2 is considered a feature, and when there are a few sporadically occurring individuals (see figure 8) that are less than or up to approximately 20 metres of one another.

Name: gudang.xaal (S), gudang.aal (M), **Stinging nettle** (*Urtica dioica)*

Feature Classification: A patch (figure 8, distribution code 5) where the density is greater than 5 plants /m^2 is considered a feature.

Multiple patches (figure 8, distribution code 6 or 7) can be considered one feature where the distance between them is less than 20 metres.

Individual occurrences (figure 8, distribution code 1) are not considered a feature.

Name: gwaayk'yaa (S), gwaayk'aa (M), **Indian hellebore** (*Veratrum viride)*

Feature Classification:

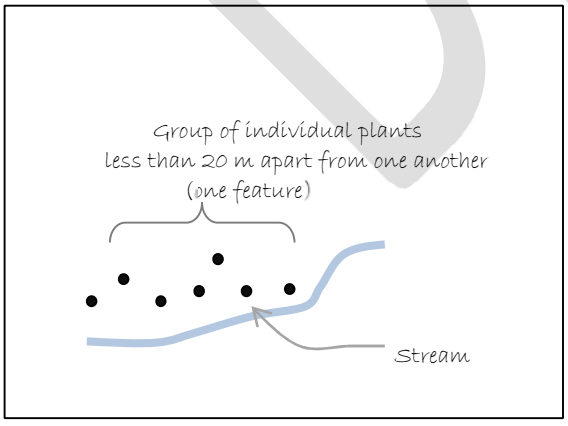
A patch is considered a feature. A patch (figure 8, distribution code 3 to 7) is either where

- There is a continuous uniform layer of plants (distribution code 4), or
- the density of a clump of stems is greater than 5 plants /m^2, or
- where the distance between several sporadically occurring individuals (distribution code 3) is less than or up to approximately 20 metres, (see Figure 9 and 10). In other words, as long as several sporadically occurring individuals or clumps of stems are within 20 metres of each other, the patch size is at the discretion of the surveyor.
- Multiple patches (figure 8, distribution code 5 to 7) can be considered one patch where the distance between them is less than approximately 20 metres.

Record patches into the following groupings:

5-10 stems
11-20 stems
21-30 stems
31-50 stems
> 50 stems

Individual occurrences or few sporadically occurring individuals (figure 8, distribution code 1 and 2) are not considered a feature.



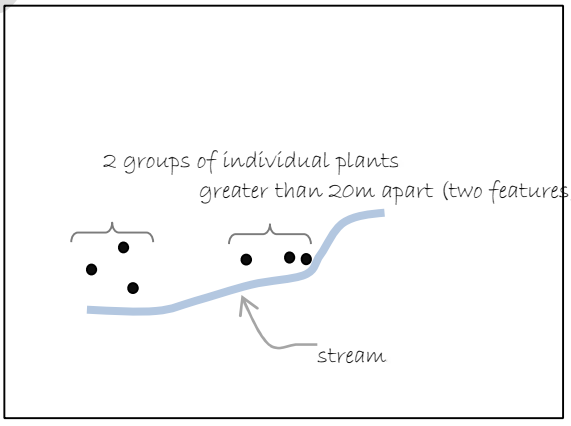


Figure 9. A group of individual plants that constitute 1 feature.

Figure10. Two groups of individual plants that constitute 2 features.

1.2.3 Field Identification of Traditional Forest Features

Seasonality/ Plant Phenology

Depending on what time of year a survey is completed, plants can be identified in a variety of life stages with winter identification being the most difficult and sometimes not possible. For that reason, CFI surveys should not be scheduled for winter. Some of the Class 1 and 2 Traditional Forest Features are woody perennials (*Black hawthorn, Devil's club, Highbush cranberry, Pacific crab apple, Stink currant, Black swamp gooseberry and Trailing black currant)* and therefore may be recognizable throughout the year. Otherwise, forest planning, (from the administrative onset through engineering of cutblocks), typically occurs 6 months to 1 year prior to harvest. If possible plan ahead (or encourage a forest licensee to) so that surveying can occur within the optimal time period between May 15th and September 31st.

Traditional forest features for the most part are:

- significantly rare, or;
- occur on the edge of or within non-forested ecosystems, or;
- grow in early successional forests or along forest edges, or;
- are associated with special coastal sites, or;
- grow in areas that are afforded protection through other Ecosystem Based Management measures.

Due to these reasons, there are relatively few species that might be identified in closed canopied old growth forests, and fewer found in closed canopy second growth forests. For this reason, pay particular attention to Devil's club (Class 1), Pacific crabapple, Stink currant, Trailing black currant and Indian hellebore (all Class 2).

1.3 Culturally Modified Trees (CMTs)

Many different types of CMTs are found on Haida Gwaii. For purposes of this feature identification manual, only a few of the most common CMTs are detailed here. Otherwise, detailed descriptions for the identification of CMTs can be referenced in *A Handbook for the Identification and Recording of Culturally Modified Trees* (2001)[9].

Bark-stripped Tree:

A class of CMT where the bark has been partially removed by Haida for social or ceremonial use. Characterized by the presence of one or more areas of removed bark and exposed wood referred to as bark-strip scars. Several types of bark stripped trees including tapered scar, rectangular scar, girdled or other. Indicators for the most common types of bark stripped trees on Haida Gwaii are as follows:

Tapered Barkstrip

[9] Resources Inventory Committee. 2001. A Handbook for the Identification and Recording of Culturally Modified Photo 1. Example of a tapered (type) bark-strip (class)
Trees. Version 2.0. Archaeology Branch, B.C. Ministry of Small Business, Tourism and CultureCMT. , Victoria, B.C.

Indicators include:

- ‘scar-crust’, which forms as smooth bark against a smooth wood face (most often dark/black in colour)
- Tapered scar from the base of the tree to a tip (elongated triangle in shape)
- Scar on the clear face of the tree (often the shaded side with fewer branches)
- Presence of healing lobes on either side of the scar
- Presence of tool marks, or
  Absence of bark on face of scar

Rectangular bark-strip also known as ‘Bark- board’

Indicators include:

- Tool marks at the base and top of scar
- Healing lobes taper, making the scar appear less parallel
- ‘scar-crust’ present on inside of healing lobes, or
- Edges of scar face (‘window’) run parallel to each other

Photo 2. Example of a rectangular (type) bark-strip (class) CMT.

Haida Logged Trees/Aboriginally logged trees:

Felled Trees

Also known as 'stump and logs', these typically have a stump and a log that has been felled beside it.

Stumps may be:

- Flat (level or sloping on a single plain)
- Step (characterized by a level top on two planes separated by a vertical step
- Barberchair: a distinctive spire of wood on one side of the stump
- Basin: a concave top with sides that slope down gradually from the outside of the tree towards the centre

Photo 3. Example of a felled (type) aboriginally-logged (class) CMT.

Sectioned Trees

As with felled trees, these features have stumps, but the logs have been cut into two or more sections.

Often sections have been removed.

Sections are commonly referred to as the butt section (closest to the stump), medial section (s) and crown sections (section with live limbs and crown).

Canoe Trees

A felled or sectioned tree where the log is partially shaped into a canoe. These can have varying degrees of completion for a shaped bow or stern, sides and/or sheer line.

Photo 3. Example of a canoe (type) aboriginally-logged (class) CMT.

Tested Trees

A test hole is a four sided hole cut into a standing tree. Normally the hole has a flat bottom and top that slopes down into the hole. Tool marks (wedge or splitting-adze marks) may be found. Test holes can range in size- widths and lengths can exceed 50cm. Note that if the two sides aren't cut, but have healing lobes, and the hole is of significant size with a prominent and slanting top side, then it is recorded as an *undercut scar* (not recorded as a *test hole*)

Photo 4. Example of a tested (type) aboriginally-logged (class) CMT.

1.4 Monumental Cedar Identification

This section outlines the criteria for a tree being classified as a monumental cedar only for the purposes of implementing Ecosystem Based Management on Haida Gwaii. Carving needs will vary between carvers and over time, and as such the criteria outlined in this section is subject to change. For purposes of
Ecosystem Based Management, the Haida Gwaii Land Use Objectives order defines a monumental as:

"A visibly sound western red cedar or yellow-cedar tree that is greater than 100 centimeters in diameter at breast height and has a log length of 7 meters or longer above the flare with at least one face that is suitable for cultural use." – Haida Gwaii Land Use Objectives Order.

Note that previous versions of the CFI Standards allowed for the discretion of the surveyor to identify 'borderline' calls: trees that had qualities classified as unacceptable by the surveyor based on measured or estimated criteria. 'Borderline' judgements are no longer acceptable: trees are either monumental or not monumental.

1.4.1 Definitions

Diameter at Breast Height: Breast height must be measured parallel to the bole of the tree at 1.3m on the high side and above the base of the tree. The high side (or high side ground) is the highest surface point of humus or mineral soil (forest floor) at the base of the tree and above the Point of Germination (POG). If the POG is above the forest floor or high side ground, measure 1.3m above the POG (see figure

12[10]).
If the diameter measurement needs to be adjusted to account for a branch, record the offset distance (cm)
and diameter below the 1.3m line.

Diameter at breast height is recorded to the nearest 0.1cm. Measures that are within ±5cm of 100cm DBH must be marked on the tree with a horizontal line at 1.3m and POG dot-marked (if applicable).

Remove obstacles (including snow) at the base of high side ground before measuring.

Point of Germination is the point in which the midpoint of a transect line between the centre of the roots (A and B in figure 11) intersect the pith or centre of the tree.

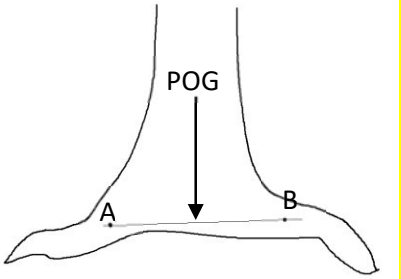


Figure 11. Measuring the point of germination (POG).

Face: Face is measured as 1/3rd of the circumference of a log (Figure 11).

Flare: The flare of the tree is the bottom of the stem typically wider than the trunk that may result in greater stability and general wind firmness. **Diameters are taken at breast height regardless of flare**.

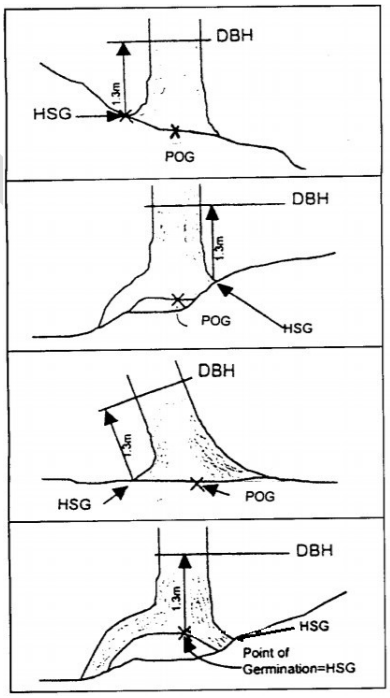


Figure 12. DBH relative to the high side ground (HSG). *Adapted from (FPCBC 1999)[1]*

[10] Adapted from the Forest Productivity Council of British Columbia. 1999. Minimum Standards for the Establishment and remeasurement of Permanent sample Plots in British Columbia. Victoria. B.C.

Log Length: Log length is measured as a minimum 7 metre length with at least one face that meets the defect allowances set out in this section.

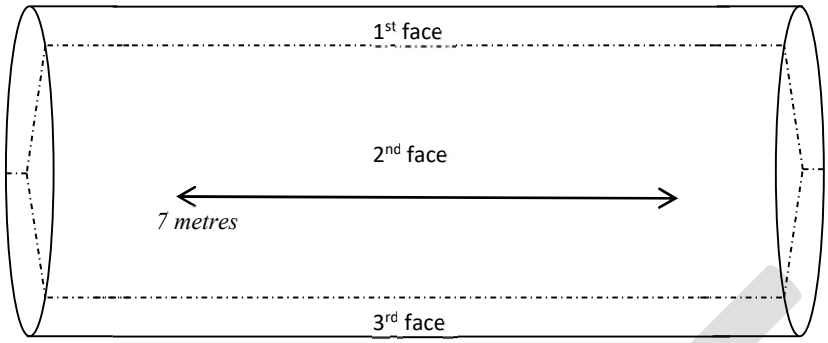
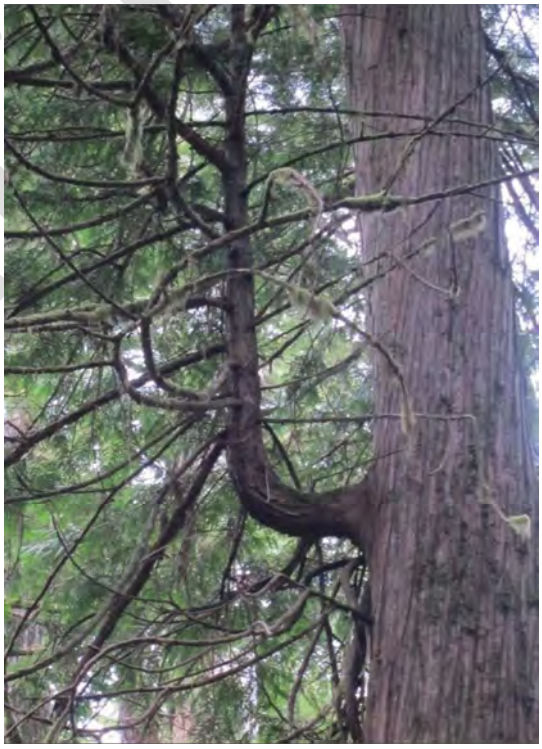


Figure 13. 'Face' of a monumental log is one-third of its circumference and the log length is minimum of 7 metres with one face that meets the defect allowances.

1.4.2 Tree Defects

This section outlines tolerances for tree defects. Note that tolerance for each type of defect should not be judged in isolation of any other defects. **While this section describes allowable tolerances for individual defects, a combination of multiple individual unacceptable defects may contribute to a tree not being classed as a monumental. This consideration should weigh whether the tree is suitable for cultural use now (haaksda tree), or is suitable for cultural use into the future (if reserved for a prolonged period).**



Knots or Limbs: Occasional knots or limbs less than 8 cm diameter are acceptable.

The allowable tolerance for limbs/knots greater than 8cm on a **log length** are as follows:

Tree DBH	
100-120cm	4 knot >8cm
120-150cm	8 knots >8cm
150-200cm	10 knots >8cm
+200cm	12 knots >8cm

Candle Limb(s): Candle limbs should be not be counted as a regular knot or limb. They are epicormic, growing on the outside of the tree and do not extend to the heart wood.

Photo 6. Example candle limb on a Western red cedar tree.

Visibly Sound: Except in extreme situations, heart or butt rot will not affect the cultural use

for Monumental cedar.
Visibly sound means that equal or greater than one half (≥50%) of the volume of the log length has sound wood. If less than one half of the volume of the log length has sound wood, then the tree is a *Haaksda* tree if log length meets the other acceptable defects

Excessive rot (>50%) below the Point of Germination (POG) is acceptable.

Geometrically, the greatest volume of a circle is nearest the outside. For example, a 100cm DBH tree with a depth of sound wood of 15cm from the outside has 51% sound basal area.

The following calculation can be used to estimate the proportion of rot in the basal area (cross section of the tree) or refer to figure 15 look-up table.

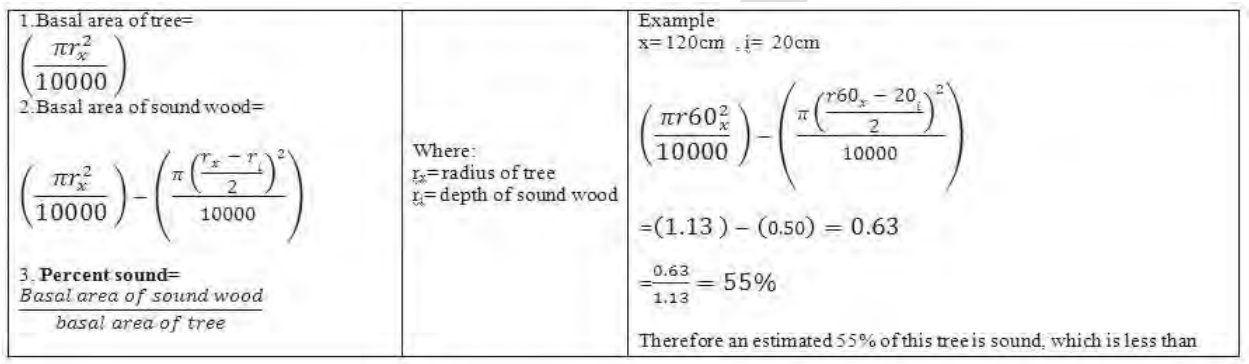


Figure 14. Calculating proportion of rot of the basal area of a tree

Diameter of tree (cm)	*Depth of sound wood (cm) rounded*
100	15
110	16
120	18
130	19
140	21
150	22
160	24
170	25
180	27
200	29
220	31

Figure 15. Depth of sound wood needed to maintain 50% sound volume

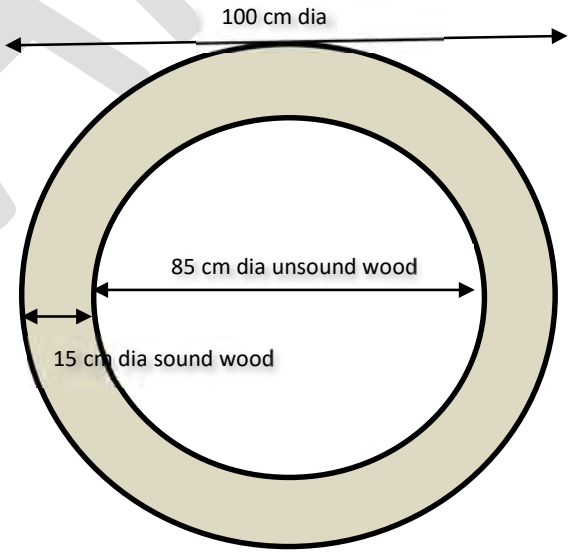


Figure 16. basal area of tree with 50% sound wood (at basal area) for a tree relative to diameter

If the sound wood (at basal area) is estimated to be near the 50% threshold, you will need to estimate the volumetric proportion of rot at the log length. To do this you will need to:

a) estimate the diameter of rot (inside) (DR),
b) the diameter of the tree (bottom) (DB),

c) the estimated diameter of the tree at the top of the *log length* (DT),

d) the *log length* (L);

e) the defect length (DL), and;

f) Know the (F) factor, which is the constant used in the Smalians volume formula (0.0001570796)

Defect length from rot in coastal areas of British Columbia can be estimated as[1]:Where rot measures	**Defect length penetrates**	**Rot type**
≤¼ of the recorded diameter of the tree	2.4m	Butt or heart
¼-½ of the recorded diameter of the tree	4.2m	Butt or heart
½ -¾ of the recorded diameter of the tree	6.0m	Butt or heart
≥¾ of the recorded diameter of the tree	7.8m	Butt

The formula for calculating the gross volume of **butt rot conical defect** is as follows[8]:

$$V=[(DB^2+DT^2)xLxF]-\left[\frac{(DR^2+DR^2)X\ DL\ x\ F}{3}\right]$$

Equation 1. Gross volume of conical butt rot

This calculates the volume of the total log length minus the volume of the rot in the log length.
Using an example from figure 15, for a tree with a:

a) diameter of defect (DR) of 85cm (100cm-15cm of sound wood or >3/4 of the diameter of the bottom)
b) bottom diameter (DB) of 100cm,
c) a top diameter (DT) of 95cm,
d) A log length of 7m, and;
e) the length of the defect of 7.8m

The gross volume of conical butt rot would be calculated as follows:

[1] Adapted from Timber Pricing Branch. 2018. Scaling Manual. Chapter 7, Ministry of Forests, Lands and Natural Resource Operations and Rural Development.

$$[(\mathbf{100^2 + 95^2})\boldsymbol{x7xF}] - \left[\frac{(\mathbf{85^2 + 85^2})\boldsymbol{X\ 7.8\ x\ F}}{\mathbf{3}}\right]$$

In this example the volume of conical butt rot is 28% of the volume of the log length.

For heart rot defects, the shape of the defect is cylindrical (not conical). The maximum length of heart rot is estimated to be 6m**.** The formula for calculating the gross volume of **heart rot defect** is as follows[8]:

$$V = [(DB^2 + DT^2)xLxF] - [A(DR^2 + DR^2)X\ DL\ x\ F]$$

Equation 2. Gross volume of heart rot

Using an example from figure 15, for a tree with a:

a) diameter of defect (DR) of 85cm (100cm-15cm of sound wood or >3/4 of the diameter of the bottom)
b) bottom diameter (DB) of 100cm,
c) a top diameter (DT) of 95cm,
d) A log length of 7m, and;
e) the length of the defect of 7.8m

The gross volume of cylindrical heart rot would be calculated as follows:

$$[(\mathbf{100^2 + 95^2})\boldsymbol{x7xF}] - [(\mathbf{85^2 + 85^2})\boldsymbol{X\ 7.8\ x\ F}]$$

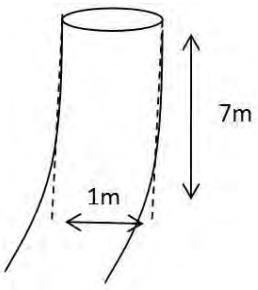
In this example the volume of cylindrical heart rot is 85% of the volume of the log length.

If using increment bores to estimate the depth to unsound wood, a minimum of 3 measurements must be completed at equal distance around the stem at DBH.

Corrugation: Corrugation does not affect a monumental trees cultural use. It tends to diminish as you go up the log length (most intense at the base of the tree), can be milled off, or in the case of a totem pole, is buried

Bark seams however can extend deep into the heart wood and are formed when lobes of the tree have closed together. However; most bark seems are limited to the base (flare or flute) or the tree (see photo 7). If bark seam or seams cover up to 50% log length and meets the other acceptable defects within the log length then it may be considered. If bark seam or seams cover more than 50% of the log length and meets the other acceptable defects within the log length then it is considered a *Haaksda tree*.

Photo 7. Butt of a tree with multiple bark seams. The highlighted example is from healing lobes that have joined. This example at the flare of the tree, would be considered an acceptable defect.



Sweep: If the trunk of the tree is curved or bowed it is called a sweep. If you can get your **log length** above or below the sweep then it is considered a Monumental.

Figure 17. Potentially acceptable sweep in a log.

Forked/candle Tree: If the tree has 2 leaders it is considered a forked top.
When a tree has more than 2 leaders or stems (either live or dead) or has multiple forked top (either live or dead) it is called a candle (or candelabra) tree.
A forked/candle tree is acceptable as long as the **log length** meets the criteria set in these standards. If a split or crack greater than 1m in length originates from the fork/candle below the top 1/3rd then it should be considered a Haaksda tree.

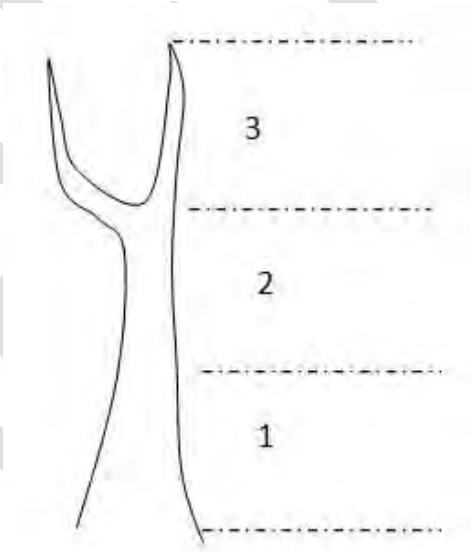


Figure 18. Division of a tree into 3rds for measuring broken tops

Broken stem: If a Western red cedar has a broken stem and is exposed for long enough, it may affect the soundness of the wood (see visibly sound section). It is still a monumental cedar as long as:

a. the **log length** meets the criteria set in these standards, and;
b. the breaking point is in the upper third of the tree (section 3 in figure 13).

If the breaking point is below the upper 3rd section of the tree, it is still a *Haaksda tree* (see *Haaksda tree* section above).

If a Yellow cedar has a broken top, and meets the other acceptable defects it may be

considered a ***Haaksda tree.***

Spike Top: A cedar with a spike top can be considered a Monumental.

Figure 19. Examples of spike tops on cedars.

Twist: Twist, or spiral grain, is divided into different tolerance classes based on size. Twist is only measured on the **log length** of the tree.

Diameter class	Twist
100-120 cm DBH	25 cm over 1m on the log length
121-150 cm DBH	30 cm over 1m on the log length
150-200 cm DBH	35 cm over 1m on the log length
200+ cm DBH	40 cm over 1m on the log length

Figure 20. Maximum acceptable twist.

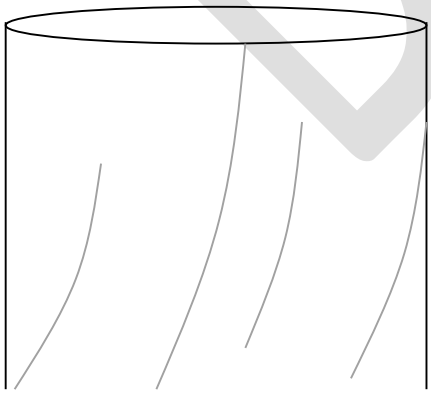


Figure 21. example of right hand twist

1.5 Cultural Cedar Stands Identification

Cultural Cedar Stands, for the purpose of Cultural Feature Identification, are defined as three or more Culturally Modified Trees, Monumental Cedar, or a combination thereof, where each tree is within 50 metres of another tree. Figure 18, example A, shows two trees within 50 metres of each other, and a third that is a greater distance, therefore not qualifying it as a cultural cedar stand. Example B shows 3 trees where each tree is within 50 metres of at least one other tree, therefore qualifying as a cultural cedar stand.

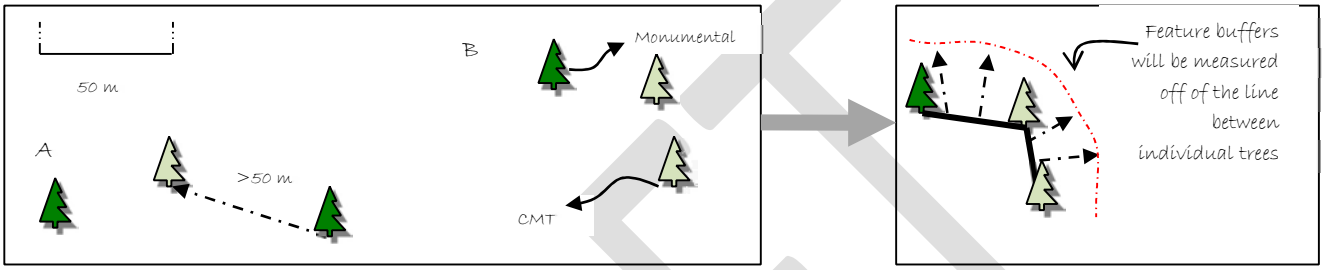


Figure 22 . Example A is *not* a cultural cedar stand. Example B *is* a cultural cedar stand.

Distances between trees are measured between the tree centres, as shown in Figure 19.

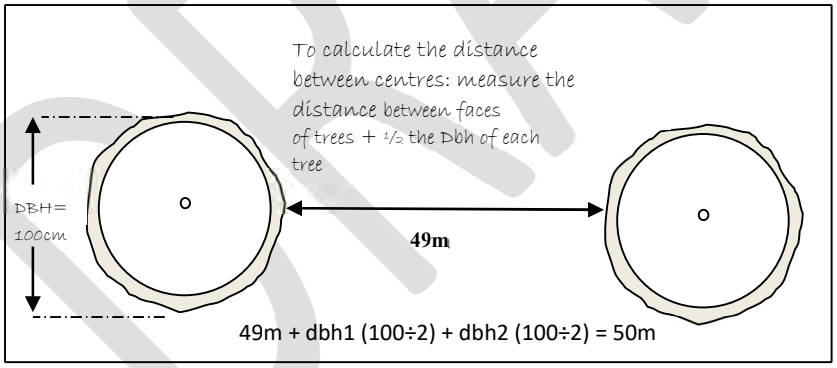


Figure 23. Measuring 50 metre distance between trees.

For identifying a cultural cedar stand, ensure that location coordinates are measured for each tree.

***Haaksda Trees**:* Haaksda trees are Monumental cedar which are in visible decline. These could be retained on site with a reserve and management zone buffer or recommended by the CFI surveyor to be removed and provided to the Haida Nation for cultural use.

Indications of a visibly declining tree are as follows:

A forked/candle tree: is considered a *Haaksda tree* where:

a. A fork occurs in any section of the tree below the top third but the log length meets the other acceptable defects in this standard, **and;**

b. The tree has a visible split or crack that originates from the fork/candle and is longer than 1 metre. A split or crack should not be confused with a bark seam.

Broken stem: If the broken or snapped stem is below the 3rd section in figure 13 (i.e. the lower 2/3rds of the tree) and meets the other acceptable defects within the log length it is considered a ***Haaksda tree.***

Visibly sound: Trees that are less than 50% visibly sound and meet the other acceptable defects within the log length may be considered a ***Haaksda tree.***

Corrugation: If a bark seam or seams cover more than 50% of the log length and meets the other acceptable defects within the log length then it is considered a *Haaksda tree*.

Frost Cracks: Yellow cedar trees with frost cracks above the log length and meet the other acceptable defects within the log length then it is considered a *Haaksda tree*.

Flat Tops: Yellow cedar trees with frost cracks (regardless of its placement on the tree) **in addition** to flat tops and meet the other acceptable defects within the log length then it is considered a *Haaksda tree*.

1.6 Monumental Quality Wood

Western red cedar and yellow cedar can last for decades (or centuries) if dead and standing or dead and down on the ground. Haida artists, including woodworkers, carvers or carpenters can use high quality cedar for cultural use, regardless of whether it is harvested live or salvaged dead wood. This section is therefore meant to address dead or down trees, typically encountered during commercial salvage operations. These trees, for the purpose of administering commercial forestry development, are considered Monumental Quality Wood as described below (dead snags, dead or down wood). In the event these are encountered during CFI surveys, they should be documented and made available to the Council of the Haida Nation through the Cultural Wood Access Program administered by the CHN and the Ministry of Forests, Lands and Natural Resource Operations.

Dead Snag: if the tree is dead it is not discounted as having monumental quality wood as long as it is visibly sound and is not in advanced stages of decay. While the 'dead top' defect does not apply, acceptable snags (illustrated as the middle tree in Figure 20) will have: no foliage present; up to 50% of twigs lost; most branches present; and a possible broken top.

Figure 24. Stages of decay. left image is a suspect living tree; middle image is dead tree with foliage missing (snag); right most image is a snag in a more advanced stage of decay (no twigs).

Dead or down wood:

Dead or down western red cedar or yellow cedar logs that can be qualified as having monumental attributes can be considered as being Monumental Quality Wood. These logs must be qualified as being free from defect, or as having acceptable defects listed in this manual. This applies to any log or tree that is not self supported, including recent blow down.

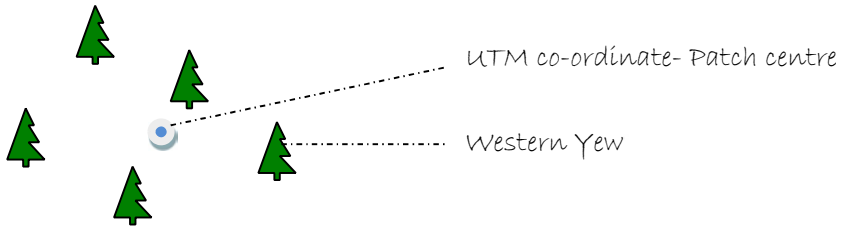
1.7 Western Yew

Individual western yew trees are considered a feature. Spatial coordinates are not required for individual yew trees when the distance between trees is less than or up to approximately 20 metres. In these cases a spatial coordinate can be taken at the geographic centre of a group of trees and trees are either flagged or the area is mapped in the report. In all cases, the number of stems must be recorded. In these cases it is still intended for the trees to be managed as individual yew stems (as per the Haida Gwaii Land Use Objectives Order).

While individual Western Yew trees are considered a feature and must be documented, further clarification is given here regarding Western Yew patches. Western Yew Patches are defined as five or more Western yew trees where each yew tree is within 5 metres of another yew tree. In this case, much like Cultural Cedar Stands, the feature can be linear (straight lined) as long as one tree is within the required distance on another tree.

Note that a Western Yew Patch is a polygonal feature made up of 5 or more separate points. Individual stems do not require spatial coordinates. Rather the UTMs or BC Albers for the estimated geographic centre of the patch should be recorded. See section 3.7 of the CFI Standards manual.

Ex.



Layering, or epicormic/adventitious rooting sometimes occurs with Western yew trees. This is when a branch or stem sends new roots into the ground and establishes a semi-independent tree, as shown in Figure 21. In these cases, each new stem is considered a separate tree for the purposes of patch identification.

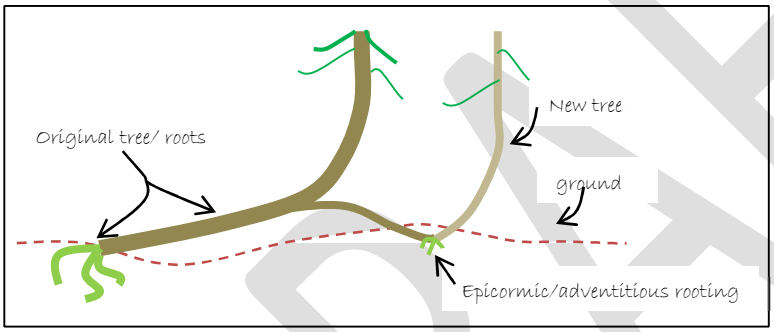


Figure 25. Epicormic rooting in Western yews

1.8 Black Bear Dens

Four types of black bear dens are:

1. Hollow trees: Dens are typically located in the inner cavities of hollow trees ; they generally provide the best dens for coastal black bears. Most live and dead hollow trees used as dens are in western redcedar (*Thuja plicata*), yellow-cedar (or cypress, *Chamaecyparis nootkatensis*) trees and western hemlock (*Tsuga heterophylla)*, These species tend to rot inside while retaining a hard outer shell, creating an empty centre. Natural openings often occur in the butts of these trees (but occasionally at candelabras or branch-holes) and are often further modified by bears to gain entry to the interior cavities (look for the bite and claw marks and hair, see below). Some hollow western or mountain hemlock trees (*Tsuga mertensiana*) have above ground entrances accessed through branch-holes.

2. Logs: Dens are sometimes located inside, or under, pieces of logs, including un-merchantable wood left behind after logging. Cedar logs decay slowly and can be used for decades whereas hollow logs of other species tend to decay much more quickly.
3. Root boles: Dens are occasionally found under the root mass of overturned trees, typically caused by windthrow. Root boles can be formed by any tree species.
4. Large old growth stumps: Dens can be found inside the base of large high-cut stumps. Sitka spruce (*Picea sitchensis*), andWestern hemlock stumps are more likely to be used than Cedar or Cypress, which, being hollow, typically lack a "roof" after logging.

Identification of Dens

Dens can often be identified by the presence of hair, claw and bite marks (both on the entrance and inside the walls of tree cavities). The presence of hair is the strongest indicator that the cavity has been used as a den. Other signs of use include marking on surrounding trees, the presence of vegetation used as a bedding inside the structure and the absence of any scats nearby except a first defecation or "fecal plug" containing hair from grooming, prey, bone chips or salmon bones. Numerous claw marks that extend up the outside of a tree may indicate repeated climbing to and from an elevated black bear den. It is very unusual for a bear to use a den at any other time of year aside from the den period. If there is recent sign of a bear utilizing a cavity outside the denning period, such as multiple scats at a bed, it is likely not a den. The exception is that females with newborn cubs may linger near the natal den until the cubs are old enough to leave safely.

Entrances to black bear dens may be very small (40 cm tall, 20 cm wide), which makes them easy to overlook. Bears likely select for dens that have entrances that are just large enough for them to fit through for security from potential predators. A large adult male black bear can fit through an entrance as small as 42 by 32 cm.

It is often difficult to determine how recently a den has been used. The colour and amount of decay of the vegetation in the bedding material can be used to estimate recent use. However, because cavities are typically very dry, normal vegetative decomposition does not occur. Bite and claw marks may likewise look fresh, especially when bark has been removed, but should not be used as the only indicator of recent use. Recently used dens will look freshly dug, with little or no plant, moss or lichen establishment near the entrance or on downslope material.

Den reuse by bears across years is not uncommon. Field crews should be aware that the signs they observe and record may be from the same bear across multiple years or from multiple bears, including family members. During the winter, coastal black bears have been known to move between a number of dens.

Appendix R: Cultural Feature Identification Standards Manual Field Card

Taan FOREST

Cultural Heritage Features Operations Reference

Report all findings and close call incidents to your Supervisor

- If you encounter potential archaeology feature, **STOP WORK** immediately
- Contact your foreman
- Leave feature alone and how you found it
- Your foreman will contact a Taan Supervisor
- Work in an different block or find an alternate work area at least 150m away
- Taan will record the location with GPS and take photos
- Taan Supervisors will contact CHN immediately and engage a professional archaeologist

Potential Sites/ Features you may find include but are not limited to the following examples:

Aug'16

Taan FOREST

Cultural Heritage Feature

Cultural Shell Deposit under exposed tree roots

Cultural Shell Deposit exposed during excavation

Aug'16

Taan FOREST

Cultural Heritage Feature

Cultural Shell Deposit Exposed by Windfall

CMT Girdled Tree

Aug'16

Taan FOREST

Cultural Heritage Feature

CMT Test Hole

CMTs – Canoe Blanks/ Plank Trees

Aug'16

Instructions: White Paper, 2 sided printing. Cut to 5.75x3 inches. Laminate and grommet at bottom.

Appendix V: Emergency Preparedness & Response (EPRP)

Corporate Management System – CMS

Taan FOREST

EPRP SOP

(Emergency Preparedness & Response)

From the Land and Spirit of the Haida

Purpose

Standard Operating Procedures (SOPs) are an integral component of our Corporate Management System (CMS) and provide key controls to ensure that our activities are carried out in compliance with legislative requirements and meet our commitments to ensuring the health and safety of employees and contractors while engaging in sustainable forest management practices.

SOPs are designed to complement Job Safety Breakdowns, quality and technical training, other SOPs and site specific plans or instructions.

Scope

This SOP provides direction regarding emergency preparedness and response for all forest management activities carried out by Taan employees and contractors.

Where conducting services on behalf of a client (e.g., BCTS) that has their own Management System and procedures, the client system is to be used.

SOPs require that each employee perform their duties to the best of their abilities. All personnel and contractors are encouraged to take responsibility to clarify plans or activities if they are uncertain about how to achieve the desired results.

Health and Safety is the first priority. Under no circumstances are SOPs to replace, or come before, safe work practices.

This Emergency Preparedness and Response Standard (EPRP) was developed to provide written guidance to employees, contractors and sub-contractors regarding emergency situations, including but not limited to, injury, fire, spills, landslides, etc. It has been developed consistent with applicable legislation (refer to the CMS Manual).

The following types of information are considered during the development of the Emergency Preparedness and Response SOP:

- Legal requirements
- Nature of on-site hazards (e.g., flammable liquids, storage tanks, etc.)
- Response measures to be taken in the event of incidents/ accidents
- Probable type and scale of accident or emergency situations and the most appropriate response
- Key contact information; communication (notification) and reporting (internal and external)
- Need for post-accident/ incident evaluation, to establish and implement corrective/ preventative action, and to review and evaluate the need for changes to the procedures

Incident Reporting

Internal Incident Reporting Requirements

- Crews must report all environmental and safety incidents (including close calls) to their Supervisor.
- Contractors must promptly report all environmental incidents and all safety incidents (including close calls) to the applicable Taan Supervisor or Manager.
- Taan Supervisor/ Representative or Contractor (as applicable) completes the CMS Incident Report Form and also completes a CMS Investigation where required (refer to the Common SOP for details and instructions). Copies of all Incident reports and investigations must be submitted to a Taan Management Representative in a timely manner.
- The following table describes examples of incidents that must be reported by Contractors and employees:

Incident Types
• Close calls
• Complaints regarding bullying or harassment, sexual harassment, gender discrimination, unsatisfactory work conditions, workplace violence
• Injuries and Incidents requiring First Aid treatment or medical treatment
• Fatalities
• Fires
• Spills
• Landslides/ Avalanches
• Illegal harvesting or other unauthorized activity (including damage caused by inappropriate disposal of chemical/ inorganic wastes)
• Property or vehicle damage
• Dangerous incident involving explosives
• Incidents involving drones (refer to Planning SOP)
• Drinking water disruptions (where applicable for non-municipal water supply)
Environmental Management Act permit non-compliances (e.g., effluent testing over limits)

Note: a dangerous incident involving explosives includes problems with particular products such as repeated or suspicious misfires or premature detonations.

- Refer to the following tables in the EPRP regarding reporting for specific incidents.
- For Incident Investigation procedures, refer to the Common SOP.

Incident Reporting Categories

The following definitions are provided for incident reporting categories:

Term	Definition	Example

First Aid	Any treatment by a first aid attendant of minor scratches, strains/sprains, cuts, burns, splinters, etc. which do not require profess medical care. The use of non-prescription medication would be considered first aid.	n/a
Medical Aid	A visit to a physician or registered medical practitioner, but the care was diagnostic or preventative, not medical treatment (as defined below). The service administered by a physician or registered medical practitioner was in the scope of a first aid attendant.	- routine application and change of dressings and bandages - x-rays for fractures where no treatment results - preventative and diagnostic procedures and treatments: - tetanus shots - uncomplicated removal of foreign bodies. - use of prescription medication in a single dose or non-prescription medication - application merely for relief of pain, i.e. burn treatment - preventative treatment for a minor injury, i.e. strains and sprains (pain management) - antiseptics to minor injuries which themselves do not require medical treatment. - hospitalization for overnight observation where no medical treatment is rendered other than first aid.
Medical Treatment	Any treatment administered by a registered medical practitioner, physician or their referral (e.g. to a physiotherapist) other than FA or MA. Medical Treatments are generally acknowledged as being beyond the scope of first aid	- suturing of wounds - application of a cast - treatment of infection arising from an injury - treatment of abrasions beyond full skin depth - removal of foreign bodies complicated by embedment, size or location. - cutting away dead skin (surgical debridement). - treatment of second or third degree burns. - hospitalization for other than diagnosis or overnight observation - loss of consciousness – length not being relevant
Restricted Work	A case in which an employee could not return to their regular duties and performed restricted duties on the advice of a doctor.	n/a

Lost Time	Any case in which an employee loses one or more days beyond the day of injury due to an occupational injury or illness.	- Note: Lost Time incidents are not counted if the only time missed was the day of injury. For example, if a worker goes home early as a result of an injury, but returns on his next scheduled day. In remote locations, up to three working days beyond the day of the injury may be lost due to travel to doctor's visits, clinical diagnosis and referral to specialists, etc. This travel time is not considered Lost Time if the worker is given a "negative" diagnosis and the worker returns to work.

Crew Boat Incident Reporting

- Incidents involving boats (with the exception of pleasure crafts) must be reported by phone as soon as possible to the Transportation Safety Board. A Marine Occurrence Report Form must also be completed and submitted within 30 days of the incident (http://www.tsb.gc.ca/eng/incidents-occurrence/Marine/).
- The following table describes examples of incidents that must be reported:
  - Boat sinks/ capsizes,
  - any collision (or close call)
  - Equipment failure (navigation, steering, propulsion, etc.)
  - Fire or explosion
  - Injury or person overboard

Incident Investigations

- Following initial incident reporting, an Incident Investigation may also be required to be completed to assess root cause, prescribe corrective and preventative actions, address weaknesses in the CMS procedures and facilitate continual improvement.
- Contractors must also assess their own safety procedures for possible revisions as part of the investigations.
- A formal Incident Investigation must be conducted for the following reasons (using the Taan CMS Investigation Form or Contractor Forms where applicable):
  - All WorkSafe reportable safety incidents and significant close calls (with the potential for serious injury) must be investigated, as well as any serious equipment malfunction/ damage.
  - All other investigations are investigated according to the following guidelines by the CMS Administrator (and/ or Management):
    - To address audit findings (including non-conformances and potential noncompliance)
    - There are repeated incidents within the same operation, facility, etc.
    - To address weaknesses within the CMS and to reflect the commitment to continually improve
    - At the request of a government agency, Taan Management or CMS Administration

- Investigations are completed in a timely manner consistent with the depth of the investigation and any required external timelines, where applicable (e.g., WorkSafe).
  - WorkSafe requires a Preliminary Investigation to be completed within 48hrs (including any planned interim corrective/ preventative action). A copy of the Preliminary Investigation must be provided to the Health and Safety Committee, or where committee is not required, it must be posted at the workplace.
  - A Final Investigation must be completed and submitted to WorkSafe within 30 days of the incident. A copy of the Preliminary Investigation must be provided to the Health and Safety Committee, or where committee is not required, it must be posted at the workplace.
- Investigations are to be circulated to appropriate personnel (e.g., Taan Supervisor/ Management) for review.
- Taan Supervisors/ Management must ensure that all investigations are complete and accurately assess root cause and prescribe sufficient corrective action to prevent reoccurrence.
- For serious incidents and close calls of Contractors, it is recommended that Taan also complete an independent investigation of the incident. Ensure the investigation does not cause interference in the contractor investigation and/ or any WorkSafe investigations.
- Investigations are reviewed and discussed at Operational Safety Meetings and Management Review Meetings to determine whether any changes to the CMS are required to address issues and eliminate any possibility of reoccurrence (changes to the CMS and procedures are completed through Management Review process).

Steps to Completing an Investigation

- If you require the assistance of any outside parties in completing the investigation, contact Taan Management.
- Treat all investigations as confidential and ensure all communicates with external parties is done through, or with the approval of, Taan Management.
- For Safety Investigations, where legal advice is required, the General Manager is responsible to seek advice from the applicable legal firm (prior to initiating an investigation) and request that the legal firm invoke solicitor-client privilege, where required.
- It is recommended that those completing investigations are trained in effective investigation procedures or have sufficient experience to be deemed qualified. Those involved in the investigation must also be comfortable interviewing fellow employees.
- The steps to an effective investigation are as follows:
  - Describe the incident or trend and any pertinent background information
  - Identify the contributing factors and immediate causes
  - Conduct root cause analysis
  - Develop Corrective Action Plans
- Throughout the investigation ensure to consider:
  - Events leading up to incident (e.g., training, plans, procedures, pre-work, supervision)
  - Conditions at the time of the incident (e.g., weather, equipment, worker)
  - Events immediately after the incident (e.g., emergency preparedness and response, actions)

Incident Description

- A detailed description of the incident must be included in the investigation which may include:
  - Background information such as pertinent employee history, pertinent site history, machine/Equipment history, description of job, procedures, and/or equipment and other pertinent details essential for the understanding of the incident.
  - List of people involved, witnesses, supervisors.
  - A timeline extending far enough back to fully develop an understanding as to why the incident occurred and concluding after the incident. The time following the incident is often used to describe the responses to the incident and the consequences of the incident.
  - Evidence and critical data collection which may include SOP's, photographs, CMS Incident Investigation Form and documented interviews and observations. Ensure any evidence is well documented or identifiable (e.g., label and describe photos).

- Interviews that should be conducted as soon as possible following an incident. The purpose of any interview is to encourage people to provide accurate and detailed information on how and why the incident occurred (avoid gathering opinions or speculation). Ensure to give the person being interviewed as much advance notice as possible, avoid complex questions and ensure to have consideration that the person may be distressed as a result of the incident.

Immediate Cause Analysis

- An analysis of the possible immediate causes (i.e., how's and why's) should be documented including the consideration of any contributing factors. There are three general categories of contributing factors to in incident:
  - Conditions (external and equipment factors)
  - Acts (human factors, procedures, planning errors)
  - Procedures (training, instructions)
- Consider the contributing factors in each category and assess their influence on the incident severity (both positively and negatively).

Root Cause Analysis

- A root cause is one that the Contractor/ Taan has the capability and authority to correct and must be limited to things which can be changed or controlled (e.g., a natural event is not a root cause, however how the emergency was managed in response to the natural event is).
- The "5 Why" technique is often used in incident investigations as it is an effective root cause analysis approach. Essentially this involves asking "Why" until no further answers to "Why" can be found. The final answer is usually the root cause.
- There is often more than one root cause depending on the circumstance of the event.
- Root causes should be clearly identified with the development of corrective and preventative actions (refer to the Corrective Action Plan section). If the root cause cannot be identified, the investigation documentation must support this conclusion.

Weather Monitoring

- The Supervisor (Taan and Contractor) will alert the crews of any weather related shutdowns or curtailments (heavy rainfall, fire weather), as well as when start-up conditions have been met.
- Taan maintains three weather stations on our tenures, and there are an additional three stations that are owned by the province. Taan obtains and reviews data from all stations.

Fire Weather

- In active areas, fire weather (including temperature, wind, relative humidity, and precipitation) must be monitored on a daily basis throughout the Fire Season (beginning on March 1 and ending on November 1, unless the area is snow covered).
- Fire Weather and Fire Danger Class may be determined by either checking the Fire Protection Branch website, daily, at: http://bcwildfire.ca/Weather/Maps/danger_rating.htm, or by making daily measurements of fire weather factors and calculating the Danger Class according to the Canadian Forest Fires Danger Rating System.

Table 1: Fire Danger Class (DGR) Danger Index Region 1

Build Up Index	Fire Weather Index				
	0	1 - 7	8 – 16	17 – 30	31 +
0 – 19	Very Low - I	Low - II	Low - II	Moderate - III	Moderate - III
20 – 42	Low - II	Low - II	Moderate - III	Moderate - III	High - IV
43 – 69	Low - II	Moderate - III	Moderate - III	High - IV	High - IV
70 – 118	Low - II	Moderate - III	High - IV	High - IV	Extreme - V
119 +	Moderate - III	Moderate - III	High - IV	Extreme - V	Extreme - V

Table 2: Restrictions on High Risk Activities

Fire Danger Class (DGR)	Restriction	Duration
Moderate - III	After 3 consecutive days of DGR III or greater, maintain a fire watch after work for a minimum of 1 hour	Until after the fire danger class falls below DGR III
High - IV	Maintain a fire watcher after work for a minimum of 2 hours	Until after the DGR falls to DGR III for 2 consecutive days, or falls below DGR III
	After 3 consecutive days of DGR IV, cease activity between 1 p.m. PDT (Pacific Daylight Saving Time) and sunset each day	
Extreme - V	Cease activity between 1 p.m. PDT (Pacific Daylight Saving Time) and sunset each day and maintain a fire watcher* after work for a minimum of 2 hours	Until after the DGR falls below DGR IV for 2 or more consecutive days
	After 3 consecutive days of DGR V, cease activity all day	Until after the DGR falls to DGR IV for 3 or more consecutive days, or falls

		below DGR IV

- Supervisors must ensure that an after work fire watcher remains on site following stoppage of high risk activities during the specific Fire Danger Class levels noted above, unless the Taan Representative/ Supervisor directs otherwise (i.e., in the event that an exemption has been granted for ground fire watch via implementation of air patrols).
- Fire watcher must ensure the work site(s) of the high risk activity is visible, are actively watching and patrolling for sparks and fires, have adequate communication tools (e.g., radio) and have at least one fire fighting hand tool to carry out fire control. Where fire is discovered, initiate appropriate fire response actions
- All activities should stop when temperature equals or exceeds relative humidity (i.e., cross over).
- When high risk activities are shut down due to hazardous conditions, certain other types of activities (e.g., drilling crews, layout field work, etc.) may continue at the discretion of the General Manager.

Fire Watch Exemption

- FLNRO may, from time to time, issue Fire Watch Exemptions for specific areas. Contact the Taan Representative to determine if there are any exemptions in place for the area.

Heavy Rainfall

- Where no weather stations are located in the vicinity, or where there are localised variations in weather conditions, rain gauges must be maintained at sites that are representative of rainfall conditions at active operating areas, where hazards exist.
- Be familiar with operating limitations due to weather conditions, including rainfall. Be prepared to alter work schedules to address current and/ or forecasted weather conditions.
- The Supervisor must assess worksites during periods of heavy rainfall and monitor local rainfall amounts.
- Precipitation levels must be monitored during active operations, results must be documented daily at a minimum, or more frequently during heavy rainfall events. During rain on snow events, follow the guidelines in the table below to calculate average snowmelt in a 24-hour period:

Table 3: Rain on Snow Events - Snowmelt Water Values (per 24 hours)

Average Air Temperature[1]	Non-forested areas (clearcut, alpine, etc.)		Forested areas (Old growth, second growth, etc.)	
	Low Wind[2]	High Wind[3]	Low Wind[2]	High Wind[3]
1°C	5 mm	15 mm	5 mm	10 mm
5°C	30 mm	75 mm	20 mm	35 mm

[1] Average Air Temperature is calculated using the average of the warmest temperature (afternoon) and the coolest temperature (morning). Temperature readings should be taken at worksite or equivalent.

[2] Wind is considered low when it is 15km/ hour (branches swaying)

[3] Wind is considered high when it is 50km/ hour (large trees swaying)

10°C	60 mm	145 mm	40 mm	75 mm

Water Balance Calculation

Water Balance = Current Moisture Level + 24hr Rainfall + Snow Melt – 24hr Drainage

Current moisture level = previous day's water balance

24 hour rainfall = daily rainfall reading at specified time (rain gauge or automated weather station)

Snow melt = where applicable, from *above Snowmelt Water Values or refer to the start-up criteria for wet/very wet zone below*

24 hour drainage = Dry Zone 35mm/24hr; Intermediate 40mm/24hr; Wet/Very Wet 50mm/24hr

Rainfall Shutdown & Start Up Guidelines

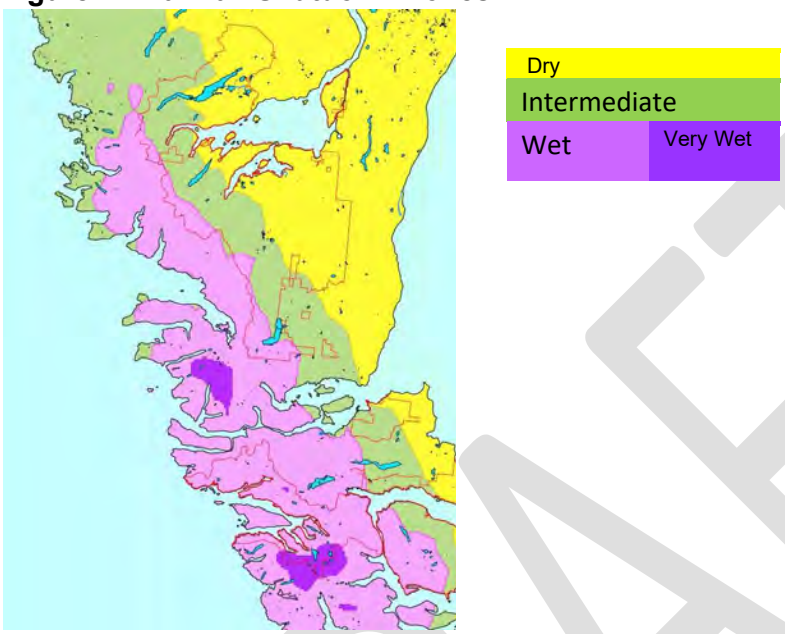
- The following Rainfall Shutdown and Start Up Guidelines must be followed (unless superseded by Professional Geotechnical advice) for all activities conducted within, directly downslope, or where workers must travel through areas of "questionable stability" (i.e., generally slopes > 50% or where assessment indicates terrain stability concerns):

Table 4: Rainfall Shutdown & Start-Up Guidelines

Rainfall Zone	Shut Down Criteria		Start Up Criteria
	Time Period	Total Rainfall (mm)	
Whichever occurs first:			
Dry (<2000 mm/yr)	24 hours	55 mm	Water Balance falls below 55 mm or two days pass with <30 mm total rainfall (48 hr)
	Since start of Shift & rain is continuing	40 mm	
	Water Balance	55 mm	
Intermediate (2000-<3000 mm/yr)	24 hours	75 mm	Water Balance falls below 75 mm or two days pass with <30 mm total rainfall (48 hr)
	Since start of Shift & rain is continuing	60 mm	
	Water Balance	75 mm	
Wet/Very Wet (≥3000 mm/yr)	24 hours	100 mm	Water Balance falls below 100 mm or two days pass with <50 mm total rainfall (48 hr). Where snow is present, add 2 mm/hr to the measured rainfall amount to get the total 48hr rainfall. Alternative start up
	Since start of Shift & rain is continuing	75 mm	

	Water Balance	100 mm	criteria for rain-on-snow in light rain conditions: total rainfall <30 mm in 48 hrs without adding 2 mm/hr for snowmelt.

Figure 1: Rainfall Shutdown Zones



- Road construction and deactivation on steep slope (>58%) should be restricted to drier weather or periods of light rainfall. Slope angles greater than 58% have a greater potential for instability during wet weather; and road construction or deactivation activities can create local conditions (such as sloughing cuts, soft footing below equipment, vibration or weight) that increase the hazard.
- Personnel working on or down-slope of areas identified to have risks of landslides are responsible to watch for the following risk indicators during periods of prolonged or heavy rainfall and seek immediate instructions from the Supervisor:
  - Excessive ground water on side-hills
  - Heavy rainfall on snowpack
  - Minor slumps and slides
  - Excessive water content in soils
  - Sudden reduction of water flow in streams; change in water color to a muddy brown colour; or stop in flow
- Regardless of rainfall levels, all activities on or down-slope of areas identified to have risks of landslides must stop if a landslide or debris torrent occurs. Where possible, equipment should be moved to an environmentally safe location before leaving the worksite.

Avalanche Hazards

- In areas where there is a risk of avalanche, specific safety procedures will be noted on the Map/ Plan (as prescribed by a qualified person). Weather conditions and safety alerts must be regularly monitored to ensure the safety of the crews. Information can be obtained at Emergency Management BC: http://www.embc.gov.bc.ca/em/hazard_preparedness/Avalanche_Information.html.

Emergency Preparedness

General Procedures

- Know and follow Emergency Procedures that apply to your location.
- Supervisors must ensure required emergency equipment and/or supplies (first aid, fire and spill) are on site, before work commences.
- Know the location and working condition of the nearest fire and spill response equipment and notify your Supervisor of any deficiencies.
- For PPE requirements, refer to the Common SOP.

Medical Evacuation Planning Procedures

In remote camps, where air transportation is the only method for transporting an injured worker, all of the following requirements must be met (OH&S Regulation):

- Before the start of operations, arrangements must be made with an air service to ensure that an appropriate aircraft is reasonably available to the workplace during operations.
- Arrangements with the air service must include procedures for determining the availability of an appropriate aircraft before the start of each work day, and notification (by the air service provider) when the service ceases to be available.
- A system must be provided that enables the pilot of the aircraft and the First-Aid Attendant attending the injured worker to communicate at all times when the aircraft is in transit to the location of the injured worker and during transport of the injured worker to medical treatment.

Spill Kit Content Requirements

Level 1	Quantity	Equipment	Size
Pick-ups, Crummies	20	Sorbent pads	18" x 18" x 3/8"
	5	Universal sorbent pads	18" x 18" x 3/8"
	2	Heavy duty oil spill disposal bags	
Additional Content-Optional Eye protection		PVC gloves	Plug 'n' Dike
Level 2	**Quantity**	**Equipment**	**Size**
Logging trucks, Heavy equipment, vehicles with ≥230L fuel (e.g., pick-ups with tidy	20	Sorbent pads	18" x 18" x 3/8"
	5	Universal sorbent pads	18" x 18" x 3/8"
	3	Sorbent socks	4' x 3"
	3	Heavy duty oil spill disposal bags	

tanks, yarders, etc.)	1	Plug ‘n’ Dike - Pick-ups with tidy tanks only (other equipment/ trucks optional)	
Additional Content – Optional PVC gloves Eye protection			
Level 3	**Quantity**	**Equipment**	**Size**
Land based activities not located near water (i.e., High risk woods, Dryland Sorts, Fuel Station or Shop).	10	Sorbent socks	6 4' x 3" & 4 3x8
	150	Sorbent pads	18" x 18" x 3/8"
	50	Universal sorbent pads (gray or yellow)	18" x 18" x 3/8"
	2	Sorbent linkable booms	5”x10’
	10	Heavy duty oil spill disposal bags	
	2 pair	PVC gloves	
	1 unit	Plug ‘n’ Dike	
	2lb	Oil Gator (or equivalent)	
Additional Content – Optional Coveralls (Tyvek or Saranex) Polypropylene rope (200 feet of 1/4”) Additional sorbent and universal pads (100)		s and Shoveakes or Pipe f nverted veir High visibility vests Box of rags/ paper towel Chemical Goggles-A/O	
Level 4	**Quantity**	**Equipment**	**Size**
Fuel Facilities located adjacent to water (e.g., Dryland Sorts, Booming Grounds).	8 lengths	Sorbent linkable booms	10' x 5"
	150	Sorbent pads	18" x 18" x 3/8"
	50	Universal sorbent pads (gray or yellow)	
	10	Sorbent socks	4' x 3"
	1	Plug ‘n’ Dike	
	2 pairs	Gloves	
	10	Heavy duty oil spill disposal bags	

Additional Content – Optional

Hipwaders & rubber boots Coveralls (Tyvek or Saranex) & rain gear High visibility vests
Safety triangles Pipe for inverted weir Nails/ staples
Stakes & sledge hammer 2 pairs chemical goggles -A/O Broom and rakes 200ft
1/4" Polypropylene rope 100 Universal Pads and Sorbent Pads (aluminum)
2 Life vests

*Refer to Appendix 5, Oil Pollution Prevention and Response Plan for additional spill response equipment that is required to be on-site at all OHF sites.

Level 4 - Taan Kit	Quantity	Equipment	Size
Located at Juskatla Sort for additional spill supplies in the event of an emergency.	4	Sorbent socks	3"X4'
	4	Universal Sorbent socks	3"x4'
	100	Sorbent pads	18" x 18" x 3/8
	100	Universal pads	18" x 18" x 3/8
	4	Sorbent Linkable booms	5" x 10'
	12	Heavy duty oil spill disposal bags	
	2 pair	PVC gloves	
	2 unit	Plug n' Dike	
	2	Splash goggles	
	2	Disposable respirators	
	2	Pairs Tyvek coveralls	
	2	Bales sorbent pads	
	1	Bale of universal sorbent pads	
	200ft	Polypropylene rope	¼"
	1	Plastic pipe for inverted weir	
	1 &1	Staple gun and box of staples	
	1 &100	Hammer and 100 nails	
	2	Life vests	
	1	Aluminum rake	
	1	Aluminum shovel	
	1	Hard bristle broom	

Fire Equipment/ Tools

- Consistent with the *Wildfire Act and Regulation*, sufficient fire-fighting hand tools must be available at worksites in a combination and type to properly equip each person who works at the site with a minimum of one hand tool. These requirements are applicable to all operations operating within 300m of forest land.
- The required fire tools must be kept on/ in equipment and maintained during Fire Season and when there is risk of a fire starting or spreading. Fire tools include fire-fighting hand tools (i.e., shovels, pulaskis, axes, hand tank pumps and fire extinguishers) and water delivery systems (i.e., a system for suppressing fire by delivering water, a suppressant or a surfactant). In situations where there is a risk of fire starting or spreading outside Fire Season, fire tool requirements are at the discretion of the Taan General Manager. Exemptions from some *Wildfire Regulation* requirements may be available from the Ministry of Forests, Lands and Natural Resource Operations, but must be obtained in advance by a Taan Representative.

Table 5: High Risk Activities

High Risk Activities	
- - Mechanical brushing - Disk trenching - Preparation or use of explosives - Using fire- or spark-producing tools, including cutting tools - Using or preparing fireworks or pyrotechnics - Grinding, including rail grinding - Mechanical land clearing Clearing and maintaining rights of way, including grass mowing	Any of the following activities carried out in a cutblock (excluding a road, landing, roadside work area or log sort area within the cutblock): - Operating a power saw - Mechanical tree felling, woody debris piling or tree processing, including de-limbing - Welding - Portable wood chipping, milling, processing or manufacturing - Skidding logs or log forwarding unless it is improbable that the skidding or forwarding will result in the equipment contacting rock - Yarding logs using cable systems

Taan Fire Tool Cache

- Taan maintains a central cache of fire tools in Skidegate for supplementing contractor fire tools in an emergency:
  - 5, water delivery systems (pump, hose supplies)
  - 1, portable water delivery system with 100 gallon tank
  - 1, 500 gallon bladder
  - 1, 3,000 gallon bladder
  - Extra hoses
  - Repair equipment
  - Shovels, powlaskis, water back packs
  - 8, 5 gallon Class A foam concentrate

Table 6: Fire Tool Requirements

Activity/ Site	Required Fire Tools
Pickup trucks/ crummies and logging trucks	- One hand tool; and - One 18L hand pump or one 3A 10BC fire extinguisher
Heavy equipment (typically equipped with automatic extinguisher system)	- - One hand tank pump and one 3A 10BC extinguisher; or - Two 3A 10BC extinguishers (It is recommended that Rock Drills use a 3A 20BC extinguisher).
Falling	- Flame out", "fire jet" or equivalent, with minimum 8oz of chemical for all fallers
All Industrial Activity worksites	- Hand tools in combination and type to properly equip all persons expected to fight fire. (Hand tools may include shovels, axes, pulaskis, hand tank pumps and fire extinguishers)
High Risk Activity worksites	- Sufficient hand tank pump cans and/or fire extinguishers (goal is "5 minute" water delivery objective) - An adequate water delivery system must be kept within 20minutes of the worksite when fire danger class is moderate or higher - Designated water filling setup or station for portable water tank units
Additional Recommended Equipment	
Fire Trucks	- Mix of fir hose: 1.5", 1" (total minimum length 450m); - 4 shovels, 4 pulaskis - 2 – 20L pails of Class A Foam - 1 fire pump kit and required fuel - 1 suction hose (if required) - 1 priming bucket
Heli Logging Operations (Main landing or service site)	- helicopter-slung water bucket (suitable for the aircraft type) available and ready for immediate use

Water Delivery System

A water delivery system is defined as one portable pump unit, a minimum of 450 m of hose with the tools and accessories necessary to correctly operate and maintain the pump unit. Water sources must include a minimum volume of 4,500L within 20 minutes of the activity.

The water delivery system is ideally a water truck with a minimum 2000 L capacity equipped with a minimum of 450m of hose along with all accessories/ attachments and a minimum of 30 L of Class A foam chemical concentrate stored on board.

Equivalents:

- A helicopter equipped with a Bambi Bucket within 10minutes (return time) of a water source for high risk activities not accessible by road/ rail.

- A heavy left helicopter (e.g. S64) with a water bucket within 20minutes of a water source and capable of delivering 4,500L/ hour.
- Gravity Feed system with 450m of hose and a water sources capable of delivering 4,500L/ hour and is within or adjacent to the active cutblock or road heading.

Emergency Response Procedures

Radio Communication Procedures

First Aid

In the event that an accident occurs requiring on-site First Aid Attendant:

1. **Use Taan truck-to-truck or repeater channel, if unable to make contact, use one of the telephone channels or the QCR Repeater. Alternatively, call the Taan Office telephone.**
2. **State "This is an emergency" and request radio silence. Stay calm and speak clearly.**
3. **Call for First Aid Attendant. Describe number injured, give clear directions to the site and wait for instructions. Do not state the name of any injured person.**
4. **If possible, stay by the radio.**

Wildfire Response

In the event of a wildfire:

1. **Use Taan truck-to-truck or repeater channel, if unable to make contact, use one of the telephone channels or the QCR Repeater.**
2. **Unrelated radio communications and road travel should cease until the incident report is provided to the Taan Forest office and permission is given by the office to continue work activities.**
3. **Stay by the radio (or phone) and maintain communication.**

Fire Extinguisher Operation

Ensure familiarity with the use of fire extinguishers:

P – pull the pin on the

A – Aim the nozzle of the extinguisher at BASE of fire

S – Squeeze the handle lever

S – Sweep from side to side

The following tables summarize key emergency preparedness and response procedures for typical emergency situations.

Confined Spaces Emergency Rescue

- Rescue personnel must be trained in the confined spaces procedure (Camp & Barge SOP).
- Rescue operations cannot be conducted unless the appropriate PPE is available - A selfcontained breathing apparatus, or air supplied respirator with escape bottle, must be used during rescue operations in an unknown or IDLH (i.e., containing a substance that is at a concentration that is immediately dangerous to life or health) atmosphere.
- Assess hazards and risks prior to entry.

- Ensure a stand-by person/ Supervisor remains posted at the entry point. Do not attempt to rescue any injured workers within a confined space unless there is at least one person that is available to remain outside the space and monitor/ assist the rescuer(s).
- In the event that rescue PPE is utilized, workers must be trained in the specific use (e.g., respirators, harnesses/ ropes).
- Maintain effective voice communication between rescue personnel and the designated Supervisor.

Medical Emergency

Emergency Preparedness	Emergency Response	Reporting
<u>Drills</u> ✓ Not required. First Aid Certification includes appropriate drills and scenarios ✓ Supervisors will ensure that helicopter evacuation training is conducted with key personnel, on an annual basis, where required ✓ Where drills are completed, they must be recorded and filed (e.g., safety meetings, Training Record Form). Training sessions and incidents count as credits towards drills <u>Equipment</u> • WorkSafe BC regulations require safety equipment to be on-site at all times and checked regularly. Report and correct deficiencies promptly. ✓ When working in remote locations, (e.g., heli) a survival pack containing emergency gear is recommended (survival blankets, matches/lighter, candles, flashlights, extra	**1. Ensure the safety of yourself/ others. Stay Calm!** **2. Determine quickest/ safest route to accident site** **3. Evaluate hazards, do not approach the patient until danger has been cleared** **4. Take control of the situation, do not move the patient unless immediate danger or instructed by the First Aid Attendant (FAA)** **5. Obtain information on nature and extent of injury, type of transportation required** **6. Contact the FAA and additional crew/ Supervisor; Do not mention names on the radio** **7. Administer first aid consistent with level of training until FAA arrives to direct**	✓ All injuries, accidents or significant close calls must be reported to the Contractor Supervisor and the Taan Supervisor ✓ All injuries must be reported to the First Aid Attendant ✓ The FAA reports injuries to the Taan Supervisor ✓ The Taan Supervisor reports all injuries and significant close calls to the Taan Manager within 24hrs ✓ Taan Representative completes a **CMS Incident Report Form** (or delegates to the Contractor Supervisor) ✓ Complete a **Safety Investigation Form** for all safety incidents and significant close calls (Taan or Contractor). Contractors may use their own Investigation Forms. <u>Supervisor/ FAA</u> • Complete a **WorkSafe BC (Form 7)** within 3 days (exceptions for more serious injuries

batteries, emergency food, water rations, etc.)

- Equipment Requirements – High Risk >20 minutes

# Workers	Equipment	FA Level	Transport
1	Personal kit	-	-
2-5	Level 1 kit	Level 1	-
6-10	Level 1 kit	Level 1 w/ Transport	ETV
11-30	Level 3 kit, dressing station	Level 3	
31-50	Level 3 kit First Aid Room		
51-200			Industrial Ambulance
≥ 201		2 x Level 3	

First Aid Attendant (FAA)

- ✓ Determine the best route, proceed to the scene
- ✓ Alert the Taan Manager
- ✓ Attend to the injured worker, evacuate (as required)
- ✓ Alert hospital (as required)

Worker/ Supervisor

- ✓ Support FAA
- ✓ Prepare evacuation trail or helicopter landing site (as required)
- ✓ Arrange a back up FAA if the FAA must leave to transport the patient to the hospital
- ✓ Preventative/ mitigative measures as prescribed per the Incident Report/ Investigation or as instructed by Government Agencies
- ✓ Replenish emergency equipment/ supplies

Taan General Manager

- ✓ Arrange back-up, support (as required)
- ✓ Notify WorkSafe BC, RCMP (as required)
- ✓ Notify the injured workers family (as required)

below) for injuries requiring transportation to first aid, medical treatment, loss of consciousness, lost time/ light duty or where incident broke glasses/ hearing aid/ dentures.

Note: If the worker is not a direct employee of Taan, the Contractor is responsible to ensure form 7 is completed.

WorkSafe Reporting

- Immediately notify WorkSafeBC in any of the following situations:
  - Serious incident or fatality
  - Fire or explosion with potential to cause serious injury
  - Major structural failure or collapse of a building, bridge, tower, crane hoist, temporary construction support system or excavation
  - Major release of toxic or hazardous substance
  - Diving or blasting dangerous incident (including missfire) or serious close call

For any of the incidents noted above, medical treatments, or serious close calls, a Preliminary Investigation must be completed within 48hrs and a Final Investigation must be completed and submitted to WorkSafe within 30 days.

- Legal Requirement (Occupational Health & Safety Regulation)

✓ Taan Requirement

Fatalities

In the event of a fatality the following additional procedures should be followed:

- Contact the FAA (do not mention names on the radio)
- Except for the purpose of preventing further injuries, protecting property or saving life/ relieving human suffering, ensure the scene of the accident is not disturbed, unless directed by the authorities.
- The FAA will notify the Taan General Manager who will:
  - contact the RCMP, WorkSafe BC and the Taan General Manager

  - notify the next of kin as soon as possible, before releasing any information to other workers or the public (this may be coordinated with the RCMP)
  - wait for the RCMP and/or WorkSafe BC Inspector to arrive and make resources available to respond to the situation, as required

- The Taan General Manager will initiate an internal investigation immediately and notify legal counsel, if required. Provide assistance with the coordination of external investigations and resources as required. Ensure internal investigations are not conducted at the same time as any external investigations.
- Taan General Manager (or delegate) to arrange grief services for individuals affected by the incident, as required.
- If the incident involves an independent contractor, Taan will provide support as needed.

Wildfire

Emergency Preparedness	Emergency Response	Reporting
• The legislated fire season is from March 1st thru November 1st unless the area is snow covered Notification • Prior to March 1st each year, a Taan Planning Representative must provide FLNRO Coastal Fire Center with a 24-hour contact telephone number valid for the duration of the fire season Drills • Not required. Drills form part of annual fire training curriculum Equipment • Refer to EPRP text for details on required fire equipment. Equipment is properly located (i.e., on equipment, in pickup trucks, etc.); fire cache stocked • Fire extinguishers must be inspected annually (inspection tag attached) by a certified	**1. Ensure the safety of yourself/ others. Stay Calm!** **2. Stop activities, evacuate if necessary (e.g., explosives or extreme fire behavior)** **3. Only initiate fire suppression where safe** **4. Move threatened equipment/ values/ ignition sources if safe** **5. Report fire to Supervisor, include:** - Geographic location of fire: mountain, town, road, block number, access, lake, river, etc. - Weather conditions at fire: hazard rating (ground fire, crowning), wind, smoke, visibility - Fire status: size, burning condition, spread, fuel (slash, plantation, timber) - Crews / Equipment on site: contact name / phone number, radio frequency, number of crew and list of equipment - Values to protect: people, dwellings, private property, bridges, felled and bucked timber, timber / plantation **6. Maintain radio communication at all times**	✓ All fires must be reported (even if immediately extinguished) to the Contractor Supervisor and the Taan Supervisor • Additional information should be collected when safe and practicable to do so: - Local weather conditions - temperature, - Precipitation, humidity, cloud cover/fog Access - helicopter, road, - boat - and distance/direction from wildfire - Adjacent fuel type (type and species) – open or heavy timber, - slash, brush, grass Water - availability - distance and direction - to nearest water source Wind speed and direction (estimate) - Slope - flat, moderate, steep Slope exposure - aspect (N, E, S,

person • Fire extinguishers must be inspected monthly for general condition, seal integrity, pressure (and documented) • Internal Fire Suppression systems must be maintained and inspected by qualified personnel (documented) ✓ Fire fighting equipment must be periodically tested (and documented) - Pumps start easily and accessories, tools and gas or mix is available - Hose is properly stored in a clean, dry place - Porta-tanks and hand tank pumps are full of water - Hand tools are in good condition ✓ Weather stations require periodic maintenance and calibration (documented)	Worker/ Supervisor ✓ Crew Boss is responsible for initial attack until relieved by the Taan Representative (Incident Commander) Taan Responder ✓ Upon receiving the report contact the General Manager. If the General Manager is not available, contact the next person on the Taan Contact list (refer to Appendix 1 - Contact Information). Incident Commander ✓ Incident Commander proceeds to the fire, evaluate and dispatch resources, as required • Response activities continue until fire is complexly out or until FLNRO assumes responsibility ✓ Preventative/ mitigative measures as prescribed per the Incident Report/ Investigation or as instructed by Government Agencies ✓ Replenish emergency equipment/ supplies Refer to Appendix 4 – Taan Fire Response Procedures for specific information regarding actioning a fire.	- W) ✓ Slope position - bottom, middle, top, ridge, gully • Resources on site or proceeding to the wildfire (contact information to relay updates and/or instruction) ✓ Other products involved such as diesel, hydraulic, engine oil, gasoline, etc. The Taan ✓ Supervisor reports all significant fires to the Taan General Manager Taan Representative notifies FLNRO (Fire ✓ Reporting Hotline or direct) Taan Representative completes a **CMS Incident Report Form** (or delegates to the Contractor Supervisor) Where fires are actioned, the Incident Commander records details of the fire throughout the event (**CMS Fire Record Form**) Taan Representative determines if further investigation is required to assess the incident (CMS Investigation Form)

• Legal Requirement (Occupational Health & Safety Regulation, Transportation of Dangerous Goods Regulation, BC Fire Code, Wildfire Act/ Regulation, FRPA)

✓ Taan Requirement

Building Fire Evacuation and Fire Safety Plan

Emergency Preparedness	Emergency Response	Reporting

• A Fire Safety Plan is required (BC Fire Code) by owners of small buildings (e.g., offices), residences (e.g., camps) and areas where flammable products are stored (e.g., shops) ✓ Camps must have a designated Fire Safety Coordinator and some firefighting equipment (pumps, hoses) to aid in evacuation/ rescue • Emergency evacuation drills required annually. If the alarm pull is to be activated during the drill, be sure to notify the Fire Department. • Where drills are completed, they must be recorded and filed (e.g., safety meetings, Training Record Form). Training sessions and incidents count as credits towards drills. <u>Equipment</u> ✓ Fire extinguishers can be used for small fires. Plan an escape route. Most will discharge completely in as few as 8-10 seconds. ✓ Class A: wood, paper, cloth, cardboard; Class B: flammable liquids, gas, solvents; Class C: electrical. • Fire extinguisher and sprinkler system requirements are facility/ building specific. Requirements are found within the BC Fire Code and as directed by the buildings insurance provider • At a minimum, there should be one portable extinguisher (2A rating or higher) and one smoke and one carbon monoxide detector per story, in each building. It is recommended that a fire extinguisher be placed every 75ft (Class A hazards; wood etc.), every 30ft (Class B Hazard; fuel), 75ft or 30ft as it relates to nearby Class A or B hazards (Class C; electrical), minimum 30ft from hazard for Class K (Kitchen). • Smoke alarms shall be installed in hallways, between sleeping quarters and living areas, and within all areas of the facility.	<u>If you discover a fire:</u> **1. Ensure the safety of yourself/ others. Stay Calm!** **2. Alert others, sound evacuation alarm** **3. Only initiate fire suppression where safe. If unable to control, isolate the fire by closing doors** **4. Evacuate to nearest exit, provide assistance** **5. Report fire to Supervisor, follow instructions** **6. Proceed to the designated Assembly Area** <u>At the sound of an alarm:</u> **1. Evacuate to the nearest exit. Walk, don't run** **2. If smoky, keep as low to the ground as possible** **3. Close doors as you exit the building** **4. If you encounter a closed door during evacuation, check for heat and do not open a hot door** **5. If exits are blocked by fire or smoke, enter the nearest room, preferably with an exterior window. Seal any cracks in the door** **6. Once outside building, proceed to designated Assembly Area** **7. Follow the instructions of the Supervisor, do not go back into the building until instructed by the Supervisor** **<u>Designated Assembly Area</u>** for the Taan Office is the parking lot north of the Co-op. Do not move towards the gas station. ***For Camp/ Barge Evacuation refer to the specific Evacuation Poster.** <u>Supervisor</u> ✓ Immediately proceed to the fire, instruct employees as required	✓ All fires must be reported to the Contractor Supervisor ✓ and the Taan Supervisor The Taan Supervisor reports all ✓ significant fires to the Taan Manager within 24hrs Taan Representative completes a **CMS** ✓ **Incident Report Form** (or delegates to the Contractor Supervisor) Taan Representative determines if further investigation is required to assess the incident (CMS Investigation Form)

• Fire extinguishers must be inspected annually (inspection tag attached) by a certified person; inspected monthly for general condition, seal integrity, pressure (and documented) • Smoke and carbon monoxide detectors must be inspected every 6 months (documented); check battery, dust • Fire alarms, sprinkler systems must be inspected annually (qualified personnel) • Exit signs must be inspected annually to ensure they are visible if power supply fails. If back up battery back ups are installed they must be checked monthly.	✓ Supervise evacuation, ensure no one is left behind ✓ Evaluate the situation and notify 911 or Fire Department ✓ Ensure a head count is completed at the Assembly Area ✓ Instruct personnel when safe to re-enter the building ✓ Preventative/ mitigative measures as prescribed per the Incident Report/ Investigation or as instructed by Government Agencies ✓ Replenish emergency equipment/ supplies	

• Legal Requirement (Occupational Health & Safety Regulation, BC Fire Code)
✓ Taan Requirement

Landslides & Natural Events (e.g., floods, earthquakes, Tsunami)

Emergency Preparedness	Emergency Response	Reporting
✓ Ensure evacuation plans are posted and evacuation routes are known. - Taan Office: Designated Assembly Area is the parking lot north of the Co-op. - Tsunami evacuation route is to drive north past the Co-op along the highway, turn left off Hwy 16 and head up to Skidegate Heights. - Tsunami Safe Zone is 30m above sea level (ASL). The following Safe Zones have been designated for Taan Operations: - Dinan - old shop location - Louise Camp & DLS – Explosive Magazines - Ferguson DLS – Waste Site - Justkatla Shop – DAT 5km Pit - McClinton DLS – Waste Site - Alliford Bay DLS – Community Evac Location – above hydro station or jct South Bay Mn and Haans Mn	**1. Ensure the safety of yourself/ others. Stay Calm!** **2. Stop activities and prepare to leave the worksite, move equipment to safe location where possible.** **3. Evacuate to "safe point" or the Designated Assembly Area** **4. Ensure to take a handheld radio and any emergency kits** **5. Listen and follow instructions from Marine Channel 16 or other authorities.** **Earthquake:** ✓ If you are indoors, "Drop, Cover and Hold". Drop under heavy furniture (e.g., table, desk). Cover your head and torso and hold on - If you can't get under heavy furniture, flatten yourself or crouch against an interior wall (do not take cover in a doorway or near tall furniture, windows, or light fixtures) ✓ Outdoors- proceed to open area away from buildings or power lines ✓ Vehicle- pull over (avoid bridges) and remain inside. Do not get out if there are downed powerlines. Wait for assistance. **Tsunami:**	✓ All slides/ natural events must be reported to the Contractor Supervisor and the Taan Supervisor ✓ The Taan Supervisor reports all events to the Taan Manager within 24hrs • Taan Representative notifies outside agencies: - FLNRO – where damage to environment (FRPA s46 (2b)) - DFO – where material enters, or likely to enter fish stream or fish habitat (Federal Fisheries Act s38 (4)) ✓ Taan Representative completes a **CMS Incident Report Form** (or delegates to the Contractor Supervisor) Taan Representative determines if further investigation is required to assess the incident (CMS Investigation Form) **Emergency Kit Contents**

- Skidegate – follow community Evac plan ✓ Ensure adequate shelter and an emergency Kit is available at the Tsunami Evac Safe Zones. ✓ Ensure all radios are programmed with the Marine Channel 16 (CBC and other radio stations may not relay accurate information). ✓ Information regarding tsunami warnings can be found at http://wcatwc.arh.noaa.gov/ and https://www.tsunami.gov/ ✓ Emergency Management BC also provides emergency alerts on their website and via Twitter (sign up is required).	✓ Taan to communicate Tsunami warnings to remote camp locations (e.g., text message) and communicate updates, as needed. ✓ Camp to notify crews (i.e., air horn in camp; communicate via radio) ✓ If an earthquake lasts more than one minute or if you have trouble standing, evacuate to higher ground immediately (30m ASL). ✓ Ensure all employees and guests and accounted for and have vehicle transportation **Flood:** ✓ Never walk or drive though a flooded area. Avoid bridges. ✓ Do not enter a flooded building unless cleared by electrician/ hydro ✓ Ensure buildings are structurally sound. Look for buckled walls/ floors Supervisor ✓ Organise alternate transportation for crews, as required ✓ Notify other crews in the area to stop work and proceed to a "safe point" ✓ Regardless of rainfall levels, all activities with risk of landslides must stop if a landslide or other natural event occurs ✓ Preventative/ mitigative measures as prescribed per the Incident Report/ Investigation or as instructed by Government Agencies	A 72-hour emergency kit is recommended with the following contents: - Water (2 liters per person per day) - Food (canned food, energy bars, dried fruit etc.); periodically refreshed - Manual can opener - Wind-up or battery-powered flashlight - Wind-up or battery-powered radio - First aid kit - A copy of the EPRP - Candles and matches - Blankets - Garbage bags - Toilet paper and other personal care supplies - Safety gloves and basic tools - Extra batteries

• Legal Requirement (Occupational Health & Safety Regulation, FRPA, Federal Fisheries Act)
✓ Taan Requirement

Drinking Water

Emergency Preparedness	Emergency Response	Reporting

• Where company owned drinking water systems are used to provide drinking water, the following emergency preparedness procedures apply: - Water samples are collected as required by regulation, or as directed by the local Health Authority. Samples are delivered to the local Health Authority office for processing - The water system is inspected prior to start-up and on an on-going basis as required - Equipment required to maintain and repair the water system is available in camp or	**1. Notify Taan Representative immediately** <u>Supervisor</u> **2. Assess system disruption** **3. Notify water users, post signage with water use instructions (e.g., boil water, alternate source)** **4. Provide alternate water sources (e.g., bottled)** **5. Coordinate repairs, following repair, test system** **6. Obtain permission from Health Official to resume water use (three satisfactory water samples required prior to resuming use)** **7. Monitor water quality** ✓ Preventative/ mitigative measures as prescribed per the Incident Report/ Investigation or as instructed by Government Agencies	✓ All drinking water emergencies must be reported to the Contractor Supervisor and the ✓ Taan Supervisor The Taan Supervisor reports all events to the Taan Manager within ✓ 24hrs Taan Representative notifies - outside agencies. Environmental Health Officer - (Follow any orders by Health ✓ Official) Emergency Management BC Taan Representative completes a **CMS Incident Report Form**

may be provided by hired tradespersons (e.g., plumbers) - It is recommended that an emergency supply of potable water (e.g., 1-2 five gallon containers) be available in remote operations for drinking water use in the event of a loss or reduction of water source, until such time that additional water can be provided (replenish every 6 months) <u>Water System Shut Down Preparation</u> • When camp is shut down > 60 days, the following procedure must be implemented before the camp water system is used: - Visually inspect the system to ensure there are no leaks, damage or obvious concerns - Chlorinate the well by adding 7 tablespoons of 5% household bleach for every 10 feet of well water depth. Run all taps until you can smell bleach, then shut off taps - Let the system sit for a minimum of 12 hours, then flush the system. Do not flush to septic system or to fish bearing stream. After flushing the system, there should be no chlorine odour at the taps - Collect a water sample after 48 hours from the time of system flushing with chlorine and review test results prior to water usage - If not already notified, contact the local Health Authority to advise that camp is being re-	✓ During a water quality disruption, additional sampling requirements may be imposed by the local Health Authority ✓ Notify Health Officer if disruptions are not short term <u>Contamination of Water Source (e.g. spill, excessive turbidity, bacterial contamination)</u> ✓ Shut down pump ✓ Notify users of water system shut down <u>Broken Water Main</u> ✓ Reduce pressure (but maintain enough pressure to prevent backflow), ensure disinfection of lines prior to use <u>Power Failure</u> ✓ Start back up power supply, notify all users of interruption if no back up power <u>Backflow or Back Siphoning</u> ✓ Purge and disinfect lines as directed <u>Flooding, water treatment equipment failure or cross connection with non-potable water supply.</u> ✓ Notify users to boil water for two minutes prior to use or disinfect with chlorine when flood conditions exist ✓ Assess the water system for damage <u>Loss or reduction of source water</u> ✓ In event of complete loss of source water, shut down pump ✓ Utilize emergency supply of potable water.	✓ (or delegates to the Contractor Supervisor) Taan Representative determines if further investigation is required to assess the incident (CMS Investigation Form)

activated		

• Legal Requirement (Occupational Health & Safety Regulation, Drinking Water Protection Act, Industrial Camps Regulation)
✓ Taan Requirement

Spills

Emergency Preparedness	Emergency Response	Reporting

Ensure adequate spill response equipment is readily available on site (refer to Spill Kit Requirements). Drills ✓ Required annually. Exercises may include: - Responding to spilled material (e.g., large pail of water) - Setting up sorbent boom across ditch or stream - Placing containment boom around specified area on water - Tailgate exercises to discuss response to specific procedures ✓ Where drills are completed, they must be recorded and filed (e.g., safety meetings, Training Record Form). Training sessions and incidents count as credits towards drills ✓ Risk Factors for Re-fuelling Operations: - Environment: weather, proximity to water, weather conditions, tides - Operational: volume and type of fuel, equipment type and condition access points, traffic, site conditions - Geographic: proximity to environmentally sensitive areas, distance from additional support services	**1. Ensure the safety of yourself/ others. Stay Calm!** **2. Eliminate ignition sources (No Smoking)** **3. Approach the spill from upwind** **4. Identify the spilled material** **5. Assess the severity of the spill, call for help** **6. Stop the source of the spill, if safe** **7. Conduct spill clean-up, block entry into water (soil dikes, barriers)** **8. On shop floors or gravel surfaces, apply particulate sorbents (e.g., kitty litter, peat moss, cellulose)** Gasoline & Jet A ✓ Do not contain gasoline or Jet A (explosive vapors, accumulate in low lying areas) ✓ Remove caulk boots before attempting control Diesel, Hydraulics, Waste Oil ✓ On water, use log booms, spill booms to contain (plug gaps between logs) ✓ On larger spills, use skimmer on contained slicks Antifreeze ✓ Mixes with water (isolate contaminated water with dikes, dams) ✓ Dispose immediately, attracts and kills animals	✓ All spills must be reported to the Contractor Supervisor and the Taan Supervisor ✓ The Taan Supervisor reports all reportable spills to the Taan Manager within 24hrs ✓ Taan Representative notifies Emergency Management BC or MoE of any reportable spills: - Any amount to waterbody or potential to reach a waterbody* - Petroleum to land ≥ 100L - Antifreeze to land ≥ 25L - Pesticides to land ≥ 5L (outside work area) - Fertilizer to land ≥ 100 kg (outside work area) ✓ Initial Spill Reporting can be completed by calling EMB, or by using the Spill Report APP. Reports are submitted to SpillReports@gov.bc.ca ✓ Where spill clean up takes >30 days, and update report is required to be submitted to EMBC. Final Reports at completion may also be required depending on the size of the spill. Agents will notify if required. ✓ Taan Representative completes a **CMS Incident Report Form** (or delegates to the Contractor Supervisor)

*Refer to EPRP App. 5 for a detailed Oil Pollution Prevention and Response Plan for the designated Oil Handling Facilities (were we receive fuel delivered by water).	Supervisor ✓ Instruct crews to contain and recover spilled material per product guidelines and MSDS ✓ Store and dispose of spill pads/ booms and collected material (e.g., contaminated soils) properly ✓ Contact external resources as required (e.g., Burrard Clean) ✓ Electrically ground any waste storage containers ✓ Preventative/ mitigative measures as prescribed per the Incident Report/ Investigation or as instructed by Government Agencies ✓ Replenish emergency equipment/ supplies	✓ Taan Representative notifies MoE and DFO if spill located in or near any sensitive areas (e.g., estuary, wetland, etc.) ✓ Taan Representative notifies the Coast Guard for all spills to the marine environment (i.e., ocean). ✓ Taan Representative determines if further investigation is required to assess the incident (CMS Investigation Form) ** - a body of water includes both marine and fresh bodies of water whether or not they usually contain water (e.g., streams, lakes, rivers, creeks, ponds, wetlands), aquifers , and also includes a naturally formed pool of water or a ditch, that drains directly into a body of water.*

• Legal Requirement (Occupational Health & Safety Regulation, Spill Reporting Regulation, Transportation of Dangerous Goods Regulation, Environmental Response Regulation)

✓ Taan Requirement

Appendix W: SOP – Common

Purpose

Standard Operating Procedures (SOPs) are an integral component of our Corporate Management System (CMS) and provide key controls to ensure that our activities are carried out in compliance with legislative requirements and meet our commitments to ensuring the health and safety of employees and contractors while engaging in sustainable forest management practices.

SOPs are designed to complement Job Safety Breakdowns, Emergency Preparedness and Response Plans, quality and technical training, other SOPs and site specific plans or instructions.

Scope

This SOP applies to all forest management activities carried out by Taan employees and contractors under the following departments:

- Planning & Engineering
- Silviculture (i.e., Planting, Brushing, Fertilization, Spacing, Pruning, Surveys)
- Harvesting Operations (i.e., Falling, Yarding, Loading, Hauling, Sorting & Booming)
- Road Operations (i.e., Construction, Maintenance, Deactivation)
- Small Scale Salvage (post-harvest and naturally damaged timber
- Facilities (Office, Camps, Shops)

Where conducting services on behalf of a client (e.g., BCTS) that has their own Management System and procedures, the client system is to be used.

SOPs require that each employee perform their duties to the best of their abilities. All personnel and contractors are encouraged to take responsibility to clarify plans or activities if they are uncertain about how to achieve the desired results.
Health and Safety is the first priority. Under no circumstances are SOPs to replace, or come before, safe work practices.

General Procedures

General Conduct

Taan is committed to adherence with labour/ employment and human rights practices that protect forest workers from bullying, discrimination or harassment, including 'whistle blower' protection. Where an employee is displaced due to shortage of work or medical injury, Taan is committed to providing as much notice to the employee as possible in addition to providing planning, job search and counselling assistance, where requested in writing by the employee.

No person shall report to work, or be knowingly permitted to do so, in a condition where in the opinion of Company management, that person's ability is so impaired as to endanger the worker's health or safety, or that of another person.

No person shall engage in any improper or foolhardy behaviour such as horseplay, scuffling, fighting, playing practical jokes, or other conduct that might create or constitute a hazard to himself or any other person. Violence in the workplace is strictly prohibited.
The possession and use of alcohol or illegal drugs is strictly prohibited. Any employee, contractor or visitor who is under the influence of, in possession of or using prohibited substances is subject to immediate disciplinary action.

All workers are expected to ensure their behaviour, actions or comments are not unwelcome, unwanted or offensive to others. Bullying and harassment includes any conduct, comment, gesture

or contact that causes offence, intimidation or humiliation. Report all concerns and complaints to your Supervisor or Manager promptly.

Taan will not knowingly, with the intent to retaliate, take any action harmful to any person, including interference with lawful employment or livelihood for reporting a complaint or providing information in good faith to law enforcement officers, government agencies or bodies, or persons supervisory to the complainant. Any individual who deliberately or maliciously provides false information may be subject to disciplinary action, up to and including termination of employment.

The Progressive Consequences Process (refer to the HaiCo Employee Handbook) will be initiated in cases where employees conduct themselves in a manner in conflict with any Taan or HaiCo policies, principles or values.

Employees and contractors must perform their duties to the best of their abilities and in a safe manner at all times. Take responsibility to clarify plans or activities if you are uncertain about how to achieve the desired results.

Roles & Responsibilities

Additional roles and responsibilities for Taan Management, Supervisors and Planning/ Engineering are documented within the CMS Manual.

Independent Contractors

(also refer to Supervisor roles and responsibilities)

Contractors and subcontractors have the responsibilities of “employers” under the Workers Compensation Act (WCA). Contractors must take full responsibility to establish and maintain a compliant Occupational Health and Safety Program. Contractor responsibilities include, but are not limited to:

- Be knowledgeable of the Workers Compensation Act and Regulations, specifically the parts relevant to the work being conducted
- Train employees to do their work safely and provide proper supervision.
- Provide supervisors with the necessary support and training to carry out health and safety responsibilities.
- Ensure adequate first aid equipment, supplies, and trained attendants are on site to handle injuries.
- Ensure up to date procedures for providing first aid at the worksite are documented and reviewed with all workers. The procedures must include:
  - the equipment, supplies, facilities, first aid attendants and services available, ○ the location of, and how to call for, first aid,
  - how the first aid attendant is to respond to a call for first aid,
  - the authority of the first aid attendant over the treatment of injured workers and the responsibility of the employer to report injuries to the Board,
  - who is to call for transportation for the injured worker, and the method of transportation and calling
  - prearranged routes in and out of the workplace and to medical treatment.

- Regularly inspect your workplaces at intervals that will prevent the development of unsafe working conditions. The inspections must include buildings, structures, grounds, excavations, tools, equipment, machinery and work methods and practices
- Immediately investigate all reports of unsafe conditions.
- Ensure unsafe conditions are remedied without delay
- Develop an effective Emergency Response Plan for each site to ensure injured workers will be transported to a hospital without delay
- Report all injuries to WorkSafeBC that required medical attention.
- Ensure proper Investigation is completed for all incidents and close calls
- Submit the necessary forms to WorkSafeBC.
- Ensure Subcontractors are not hired without the consent of Taan.
- Promptly report all safety and environmental incidents and all close calls to the Taan Representative, assist or complete Incident Report.
- Submit monthly safety documentation for each active jobsite
- Provide information to Taan when requested (e.g., safety meetings, training records, weigh scale calibration, rain gauge records, etc.).

Prime Contractor

In addition to all the responsibilities for Independent Contractors, Prime Contractors have several unique responsibilities that include, but are not limited to the following: (refer to the Contract Agreement for further details):

- Ensure the activities of other employers, workers or other persons at the workplace relating to occupational health and safety are coordinated and regularly inspected.
- Do everything reasonably practicable to establish and maintain a system or process that will ensure compliance with Workers Compensation Board legislation.
- Ensure that each employer provides documentation identifying the Supervisor for the employer's workers at the multi-employer workplace (where applicable).
- Designate a qualified person to supervise activities at the worksite.
- Submit Notice of Project to WorkSafe BC and copy to Taan.
- Ensure proper Investigation is completed for all safety incidents and close calls (including incidents of Sub-contractors).
- Perform on-site assessment and review with crew prior to commencing work in a new area (including Sub-contractors).
- Submit a monthly summary of incidents, investigations and inspections completed to the applicable Taan Supervisor. Track monthly safety statistics using the Taan Safety Statistics Report Form and forward to CMS Administration.
- Post signage for safe access to work area: Prime Contractor Contact, Radio Frequencies, First Aid, Road Kilometers, Blasting Areas and Falling Areas, etc.

Supervisors (company and contractor)

Supervisors play a key role with very specific health and safety responsibilities that need to be understood.

A supervisor is a person who instructs, directs, and controls workers in the performance of their duties. A supervisor can be any worker — management or staff — who meets this definition, whether or not he or she has the supervisor title. If someone in the workplace has a supervisor's responsibilities, that person is responsible for worker health and safety.

Supervisor responsibilities include, but are not limited to, the following:

- Assume responsibility for implementation of the CMS in respective areas of authority.
- Be knowledgeable of the Taan CMS applicable to the work being supervised and ensure workers under your direct supervision are knowledgeable of the applicable portions of the Taan CMS.
- Know the WorkSafeBC requirements that apply to the work under your supervision and make sure those requirements are met
- Ensure the health and safety of all workers under your direct supervision; ensure workers under your direct supervision are made aware of all known and reasonably foreseeable health or safety hazards in the area where they work.
- Ensure a Notice of Project has been submitted to WorkSafe BC prior to start up.
- Ensure a WorkSafe BC First Aid Assessment has been completed for the workplace.
- All operations (harvesting, roads and salvage) must complete a Taan Workplace Safety Plan Form before commencing work in a new cutblock.
- Ensure a MOF Notice of Commencement has been submitted.
- Ensure all personnel are competent and have appropriate training and experience for their job (including applicable SOPs; handling of petroleum and hazardous materials).
- Do not allow any personnel to carry out the work unless satisfied it can be done safely.

Provide PPE to workers and maintain in good condition.

Attend and deliver all required Pre-Works using the Taan Pre-work Checklist (in new work areas and after prolonged shut-downs).

Ensure regular safety meetings are conducted (documented and retained on file). A Taan Representative may request contractor records from time to time.

- Verify conformance with Plans, awareness and competency of crews and contractors through completion of Internal Inspections (Worksite & Facility).
- Complete or coordinate completion of environmental and safety incident (including close calls) reports using the CMS Incident Report Form (contractors may complete the form at your request) and the CMS Investigation Form where required (refer to Investigation procedures).
- Implement Corrective/ Preventative Action Plans, as applicable.

Employees/ Workers

On a worksite, everyone has varying levels of responsibility for workplace health and safety.
You should know and understand your responsibilities — and those of others. If you're a worker, you also have three key rights.

- The right to know about hazards in the workplace.
- The right to participate in health and safety activities in the workplace.
- The right to refuse unsafe work.*

As a worker, you play an important role in making sure you — and your fellow workers — stay healthy and safe on the job. As a worker, you have safety responsibilities that include, but are not limited to the following:

- Attend a Pre-work meeting with the Supervisor (using Taan Pre-Work Checklist) prior to starting work in a new area and following prolonged stoppages of work
- Know, understand and follow all SOPs, Safe Work Procedures and the approved Plan.
- Know who your Supervisor and designated First Aid Attendant is and how to contact them.

- Refuse Unsafe Work (consistent with WorkSafe requirements) report all unsafe conditions to the Supervisor.
- Follow safe work procedures and act safely in the workplace at all times
- Never work under the influence of alcohol, drugs or any other substance, or if you're overly tired.
- Do not create hazards for yourself or others. If a hazard cannot be mitigated, immediately report the hazard to your Supervisor (and document as required). Do not hesitate to work in an approved alternate area if there is a danger of you or another worker getting hurt.
- Notify your Supervisor and crew members if you have any allergies or other medical conditions that could potentially impact workplace health and safety. Communicate any specific emergency response or First Aid treatment procedures. Keep a record of any allergies or medication being taken on file at the office.
- Participate in monthly safety meetings.
- Report all safety, environmental and close call incidents to your Supervisor; assist in the completion of the Incident Report Form, as requested (completed by Taan or delegated to Contractor).
- Take reasonable care to protect the health and safety of you and others in your work area.
- Carry out work in accordance with the Taan CMS, established safe work procedures (where applicable), and applicable Plans.
- Participate in annual emergency drills (e.g., building evacuation, fire, spill).
- Use or wear PPE as required (conduct visual daily inspection).
- Receive communications from external parties (public, contractors, agencies, etc.), forward to applicable Taan employee and Administration for record keeping, where applicable.
- Report any contraventions to the Taan CMS, including any absence or defect of PPE to your Supervisor or Management.
- Cooperate with WorkSafe BC or any other persons carrying out duties under Workers Compensation Board legislation.
- All required safety equipment must be on site at all times and checked regularly by Supervisors and Crew. Deficiencies must be corrected promptly.
- Do not perform work that you are not trained to do
- Know the location of emergency equipment (e.g., first aid, fire extinguishers, fire tools, spill kits) and know how to safely operate the equipment. Keep equipment in good working order and ready for use at all times.
- Miscellaneous Responsibilities:
- Conduct and prescribe activities to manage water drainage patterns, minimize site disturbance and prevent sediment from entering watercourses.
- Do not store or transfer petroleum or hazardous materials within 30m of a stream, lake or wetland. This includes servicing of trucks and equipment.
- Return all petroleum and hazardous waste, as well as litter and other waste materials to the office or shop for proper disposal (refer to the Hazmat SOP for details).
- Be aware of changing weather conditions and be prepared to revise work schedules accordingly.

- Know the location of emergency equipment (e.g., first aid, fire extinguishers, fire tools, spill kits) and know how to safely operate the equipment. Keep equipment in good working order and ready for use at all times.
- Report all required repairs promptly. Ensure equipment is included in a regular maintenance program.
- Do not enter an intentionally blocked work area or site unless permission is obtained first (i.e., must contact the appropriate personnel on site before entering).
- Never assume a machine operator sees you. Always question an unclear signal. Establish eye contact, confirmed by a hand gesture.
- Maintain good housekeeping practices in work areas.
- Know where to find WHMIS information and how it applies your activity.
- When working in steep terrain, or driving through steep terrain in order to access the worksite, be aware of indicators that could cause slope failure (e.g., heavy rainfall, soft or muddy soils).
- Be aware of any overhead power lines. If your machine comes into contact with a power line stay in your machine, do not leave your seat and do not allow anyone else on the machine. Call for help on the radio.

- Wear appropriate clothing for the job (in addition to PPE requirements in the EPRP SOP). Several layers are recommended in cold conditions and take care to protect extremities. Wear loose-fitting, light coloured, cotton or silk clothing if possible, in hot weather. Drink fluids and be aware of the signs of hypothermia or heat stress.
- If fog is hindering doing a job safely, stop and wait for the fog to dissipate to a point where it is safe to continue. Stop work in foggy conditions when helicopter is the only means of evacuation.
- Seat belts must be fastened at all times while travelling in the vehicle or operating any mobile equipment. Drive with headlights and tail lights on at all times. Reduce speed according to road or environmental conditions. Always keep to the right-hand side of the road, especially on corners.
- ATVs must be used in accordance with the instructions in the operator's manual. ATV operators must be trained in the safe operation of the vehicle, prior to any use.
- When working in the office, ensure work areas are kept tidy. Ensure no tripping hazards exist. Never open more than one file drawer at one time (tipping hazard) and ensure drawers are closed after use.
- Consider taking periodic short breaks to stretch, walk around to prevent repetitive stress and strain injuries.

Communication

Discuss problems, safety concerns or opportunities for improvement to the CMS, SOPs, or Standards with your Supervisor. Communicate any suggestions or comments on the adequacy of procedures to your Supervisor.

Approvals and Notifications

Prior to the commencement of activities, ensure the following approvals and/or notifications are in place:

- Cutting and/or Road Permit - Taan Planning Representative

- WorkSafe BC Notice of Project – Taan Planning Representative or Contractor (Roads and Harvesting)
- MOF Notice of Commencement Taan Planning Representative or Contractor (Roads and Harvesting)
- Wildfire Act Annual Notification/Exemption - Taan Planning Representative
- Water Sustainability Act Notification - Taan Planning Representative

Pre-Work Meetings

Pre-works for cutblocks (and related road activities) must not include multiple areas on one prework. Multiple road segments related to the same block are permitted.

Planners, Supervisors and Crew must attend a pre-work meeting before starting work on a new project. Pre-works are also recommended following pro-longed stoppages of work or when personnel change positions.

Planners are to ensure that all relevant information is passed on to the Taan Supervisor (i.e., current approved Plan, safety concerns, site specific concerns, operational constraints, sensitive areas, etc.). Pre-works are documented using the Pre-work Checklist, action plans are entered and tracked for completion within the Corporate Tracking System.

Where necessary, a field visit may be required. The amount of field review is dependent on the complexity of the activities. The review is complete when the Taan Representative and Planning Contractors are confident that the plans will be correctly implemented or developed and appropriate checklists/ maps are signed off. Refer to the table titled “Pre-Work and Inspection Requirements”

Taan Planning to Taan Manager/ Supervisor

A Taan Manager must attend a Pre-work (CMS Pre-work Checklist) with a Taan Planning Representative to review the Plan and approvals prior to starting work in a new area to ensure that the Plan information is adequately communicated and understood. It is recommended that the Taan Supervisor also be present where schedules permit. The Pre-work includes discussions to ensure that the work site is safe and hazards are identified and reviewed.

Note: A Planning to Manager/ Supervisor Pre-work is not required where the Taan Planning Representative is acting as the Supervisor/ Project Supervisor).

Field review is completed where required (i.e., dependent on the complexity of the Plan).

The Inspections frequency is determined based on level of Risk of the project, block or roads (refer to section titled “Inspections”). The default inspection frequency for active roads and blocks is “monthly”.

Taan Manager/ Supervisor to Contractor Supervisor

A Taan Manager must complete a Pre-Work with the Contractor Supervisor before work begins. It is recommended that the Taan Supervisor is present at the pre-work meeting, where schedules permit. Forward the completed Pre-Work to Administration for filing and action plan tracking.

This portion of the Pre-Work may be completed for multiple phases or areas, at the discretion of the Taan Manager (e.g., one Pre-work may cover all areas within an operating area for projects such as planting; one Pre-work may be completed to cover all phases to be carried out on an area by a single contractor (i.e., stump to dump).
For cutblock and road phase/ activities, the Taan Supervisor must walk all boundaries with the Contractor Supervisor following completion of each phase, prior to hand-off/ pre-work release with the next phase Contractor, by the Taan Manager. The Taan Supervisor and/ or Contractor will conduct boundary ribbon/ paint re-fresh where required.

Contractor Supervisor to Crew

The Contractor Supervisor must complete a Pre-Work meeting with all crew members using a Pre-Work Checklist (this includes Sub-contractors). This includes situations where workers are moved between work sites, or are added to a work site following the initial pre-work.

For cutblock and road related phase/ activities, the Taan Supervisor must attend the Contractor pre-

work meetings to ensure that the requirements are clearly communicated. The Taan Supervisor must walk all boundaries with the Contractor Supervisor(s).
It is recommended that the same form (Taan Supervisor and Contractor Supervisor) is used for the Crew Pre-Work. However, a new Pre-Work form may be used. Crew members must sign the Checklist. Contractor Supervisors must ensure that any required follow up actions are documented and tracked for completion and maintain a copy of the Pre-work on file. Records must be available to Taan, upon request.

Prime Contractor Hand-Off

In addition to the pre-work requirements noted above, a Prime Contractor Hand-Off checklist is also required to be completed for every change in Prime Contractor for a specific work area. A Taan representative must be present at the Prime Contractor Hand-Off meeting.

Stop Work Instructions

Contact the Supervisor immediately if you are aware of an environmental or safety risk, such as the following (ensure you stop work and move to alternate location until you receive direction from your Supervisor):

- You can't follow the Plan or are unsure of the Plan.
- You discover a map discrepancy, or feature not identified on the map (e.g., an unmapped stream, culturally modified tree, bear den, fish observed in an incorrectly classified stream, or any potential problems that may result in an adverse safety or environmental impact.
- You observe any safety or environmental hazards such as (siltation or sedimentation, visible signs of detrimental soil disturbance, damage to bridges or culverts).
- Any environmental or safety incident occurs.
- You observe any unauthorized cutting (e.g., outside the approved boundary).
- You observe any unauthorized activity or harvesting.

Changes to Plans

Changes to the Plans that potentially impact the environment or safety are not permitted without approval by Taan representative. Typically changes to plans result from stop work requirements as mentioned above.

- Proposed changes to Instructions and Plans that arise during, or following, the Pre-Work Meeting must be referred to Taan personnel for approval.
- Taan personnel will determine if changes to plans require further CHN/ Provincial approval and/ or updates to planning documents and amendments to pre-works.
- All changes must be clearly documented and retained on file (e.g., change to the Plan/ Map, email or note to file, etc.) prior to implementation.
- A new prework meeting will be held with the contractor to review and sign off on the amendments.
- If the maps are revised, new copies will be provided to the contractor and the Taan supervisor will collect and retain all of the old maps

Safety Meetings & Statistics

- Managers/ Supervisors are responsible to coordinate regular employee health and safety meetings (typically monthly) using the CMS Safety Meeting Checklist and ensure the checklist is filed. Action items are tracked in the Operations Tracker to ensure follow up and timely completion.
- Contractors must conduct regular (e.g., monthly) safety meetings with crew and provide a monthly summary of incidents, investigations etc. using the Taan Safety Meeting & Statistics Form (or equivalent).
- It is recommended that a Taan representative periodically attend/ participate in contractor safety meetings (target is monthly).

Worker Complaints

In the event that employees, contractors or sub-contractors have any complaints related to Taan's management activities, conformance with the FSC Standards, or working conditions while working on Taan tenures (including sexual harassment or gender discrimination), they are encouraged to communicate the complaint, in writing to their employer and to Taan.
In the event that concern or complaints are brought forward by any employee or contractor, promptly report it to the Taan Manager and the CMS Administrator. Where the contractor has established procedures to handle the complaint, they will be followed. For Taan, or if the contractor does not have a process, detailed instructions and steps required to resolve complaints are documented within the FSC Management Plan, Complaints process.

External Communication

A Taan Representative will generally communicate with all external parties. Should an outside party approach a worksite, notify your Supervisor immediately. It is important to determine the purpose of their visit, for example, it is an inspection, audit, investigation or disruption. Request the visitor to identify themselves and provide contact information.

External Inspections and Investigations

In the event of an external inspection or investigation (e.g., WorkSafe BC, Natural Resource Officer etc.) the following procedures apply.

External Inspections

Inspections are usually a routine spot check.

Contact the Taan Representative immediately. Request Supervisor is present.

Do not interfere with the officials and assist them to gain access to the worksite, where required. If questioned, provide honest answers. Only provide the facts, do not guess or provide personal opinions.

External Investigations

Investigations may be conducted when there are suspected violations or in the event of a serious incident.
Notify your Supervisor immediately and do not answer any questions until your Supervisor is present (contact your union representative where applicable).
The Supervisor must notify Taan Management immediately.

Ask the Official for identification, write down their name and contact information and provide it to your Supervisor. Ask the Official to put their questions in writing.
Keep in mind that any statements provided may be used against you in court. You are not required by law to make any statements. If you make a statement, ensure to provide only the facts, do not guess or provide personal opinions. Do not make any statements on behalf of Taan.

In the event that an Official arrives with a search warrant or wishes to seize items in plain view, respectfully request that the Official waits until Taan Management is on site before commencing seizure.
The Official may take copies of permits, Plans and Maps. Additional documents cannot be seized without a search warrant.

In the event of a seizure, request proof of the Official's identity and authority, the event being investigated and the purpose of the seizure.

The following practices should be followed:

- Avoid writing notes on your copies of plans/ maps or your log book
- Make your own detailed notes about the officials visit immediately afterwards noting time, date, place of visit, name and agency of the official, questions asked and photos taken where applicable, and documents that the official requested, saw or copied.

Reporting and Recording

Taan Management (with assistance from CMS Administration) are responsible to provide responses to external communications regarding the CMS, forest management activities or complaints/ disputes regarding Taan's forest management activities, non-conformities/ noncompliance, media and/ or government agencies.

Operations personnel and the CMS Administrator may from time to time represent Taan during operational level planning and public consultations relating to forest management planning and certification.
Communications received (e.g., via website inquiries, phone, email, in person) are recorded on file (i.e., emails or notes that contain the date, name, contact information, nature of inquiry and responses provided). The person receiving the inquiry is responsible to follow up unless they delegate or forward to another Taan or HaiCo individual.

Documented comments or concerns from external parties shall be forwarded to the applicable Taan Supervisor for evaluation and decision regarding an appropriate response. Consult the General Manager and/ or President where required.

Dispute Resolution Process
Taan maintains a Dispute Resolution Process.

In the event that concern or complaints are brought forward by any stakeholder, member of the public, employee or contractor, promptly report it to a Taan Manager and the CMS Administrator. Detailed instructions and steps are documented within the Dispute Resolution Process.

Monitoring & Inspections

Taan will monitor contractor activities in each active block to verify compliance with safety and environmental requirements. Taan supervisors will, at a minimum, conduct site inspections at intervals identified in Table 1. of the Prework and Inspection Requirements and document the results on a "Workplace Inspection Form". Additional monitoring will be completed by reviewing the safety

documentation each contractor will submit monthly. Refer to the Contractor Management Program for details.

Supervisors must regularly monitor activities within each active work area to ensure that crews are carrying out the Plan correctly, safely and in an environmentally responsible manner. Informal project monitoring may be documented in alternate locations (e.g., project files, diary, etc.).

Contractors must regularly monitor the condition and functionality of all safety related features on equipment (e.g., guard rails, escape hatches, hand rails).

Formal inspections of forest management activities are completed by Taan Representatives using the appropriate CMS Inspection Checklist (Worksite, Facility) to ensure that contractors and Prime Contractors are meeting all of the CMS and legal requirements. Follow up inspections with requests for documentation (e.g., training records, safety meetings, pre-works, etc.), are completed as required based on inspection performance, history, etc.

Inspections for cutblocks (and related road activities) must not include multiple areas on one pre-work. Multiple road segments related to the same block are permitted.

Taan Representatives must conduct formal inspections of active operations (i.e., crews on site) at the specified frequency using the appropriate checklist (CMS Forms and Checklists), refer to Table 1. The default inspection frequency for active roads and blocks is “monthly”.

The frequency of inspections over and above the minimum requirements may be adjusted to address the complexity of Plans, experience of the crew, potential environmental impacts, potential for public access and weather conditions (e.g., seasonal constraints). Consider presence of resource features (water quality, fish steams, drinking water, terrain stability, soils, CMT, karst, nests, bear dens, etc.).

Inspections of cutblocks and road phase/ activities must include a walk-through of all boundaries and a selection of creeks, with participation of the Contractor Supervisor(s).

Supervision and Inspections of the CMS will include periodic inspection of equipment, PPE, vehicles, tidy tanks, etc. that are used on site to ensure we are meeting legal and certification requirements. These inspections may occur with, or without permission granted by the workers, site supervisor or contract principle.

Vehicles (or storage boxes) will not be entered without permission. If the Taan Representative is uncomfortable with any vehicle contents, the inspection may be discontinued and the issue brought to the Contractor’s attention.

Where inspections are being completed on behalf of the Taan Harvesting or Roads Supervisor (e.g., CMS Administrator completes inspection) the applicable Harvesting or Roads Supervisor must review, develop actions plans and sign off the form.

Where significant issues are identified during inspections (formal or informal), the General Manager must be notified.

Table 1: Pre-work & Inspection Requirements

Activity/ Area	Responsible	CMS Form/ Checklist	Minimum Frequency
Road, Cutblock Salvage and Silviculture Layout	Taan Engineering	F&E Planning Checklist(s)	Once per Cutblock (Layout Review checklist is optional)
	Taan Planning	Prework Form	Annual (at project start up)

	Engineering/ Forestry Contractors	Safety Meeting and Safety Stats	One per month
Small Scale Salvage	Taan Planning/ Salvage Coordinator	Pre-work Form	Once per project area or block
	Salvage Coordinator Salvage Contractor	Worksite Inspection	One per month
	Salvage Contractor	Safety Meeting and Safety Stats	One per month
Landfill	Taan Operations and/ or Contract Supervisor	Landfill Inspection	Annually
Operations – Roads (Road construction/ reactivation, deactivation, maintenance, major structure project)	Taan, Roads Supervisor and/or Operations Engineer	Pre-work Form	Construction – each major heading Deactivation – each major heading Maintenance – each major project Major Structure – each major project
		Prime Contractor Hand-Off Checklist	Completed for every change in Prime Contractor designation for an area
		Bridge (& Major Culvert) Inspection Checklist	2 yrs – wood structure, 3 yrs – steel structure (not required if barricaded)
		Road Inspection Form	Annual – "heavy industrial use" permit roads 2 yrs – "light industrial use" permit roads
		Worksite Inspection Form	Monthly per Cutblock (& related roads) & Final
	Prime Contractor	Workplace Safety Form	Once per cutblock
		Worksite Inspection Form	One per month
		Safety Stats and Safety Meeting Documents	
Tree Crown Modification	Taan Harvesting Supervisor	Pre-work Form	Once per project area or block
		Prime Contractor Hand-Off Checklist	Completed for every change in Prime Contractor designation for an area
		Worksite Inspection Form	Once per project area or block/ One per month

	Prime Contractor	Worksite Inspection Form Safety Stats and Safety Meeting Documents	Once per project area or block/ One per month
	Prime Contractor	Workplace Safety Form	Once per block
Operations – Harvesting (Falling, yarding & loading)	Taan Harvesting Supervisor	Pre-work Form	Once per phase/ new contractor
		Prime Contractor Hand-Off Checklist	Completed for every change in Prime Contractor designation for an area
		Worksite Inspection Form	Monthly and Final per cutblock
	Prime Contractor	Workplace Safety Form	Once per phase
Activity/ Area	**Responsible**	**CMS Form/ Checklist**	**Minimum Frequency**
	Prime Contractor or independent contractor if no Prime	Worksite Inspection Form Safety stats and safety meeting documents	One per month
Log Sorts, Shop, etc.	Prime or Independent Contractor using facility and Operations or Contract Supervisor	Pre work Checklist	Start of use of facility
		Prime Contractor Hand-Off Checklist	Completed for every change in Prime Contractor designation for an area
		Facility Inspection Checklist	Quarterly – Active facilities Annual – In-active facilities
Forest Road Inspections	Taan Operations Engineer	"Roads" Smartsheet	Level 1 – On-going Level 2 – Annual Level 3 -Every 2 Years
Silviculture Projects	Taan Foresters	Pre-work Form	Once per project area or block
Fire Hazard Abatement	Taan Operations Forester	Hazard Abatement survey as part of Post-Harvest Inspection Checklist	Every 6 months and at Post harvest (where no exemption in place)
Taan Office, Truck, Boat and Employee	Project/ Safety Coordinator	Office & Equipment Inspection Form	Quarterly
Camp Operations			

	Project/ Safety Coordinator	Camp Inspection Checklist	Monthly

Safety Overview and Training

Taan Forest is responsible for ensuring Taan employees are properly instructed and trained on how to do their jobs safely. This section contains many of the activities common to our operations and guidance on how to do them safely and in accordance with industry regulation. On an annual basis, managers will ensure each worker under their supervision reviews the topics applicable to their job. The annual reviews will fulfill a portion of each workers training requirements.

Controlled Product Handling Training

A controlled product refers to a product or substance that is listed in one of the six hazard classes in Controlled Products Regulations (CPR) part IV, defined for Workplace Hazardous Materials Information System (WHMIS). These are also substances which are included in schedule II of the Hazardous Product Act (HPA).

These products may cause serious health problems in workers or fires and explosions in the workplace. Workers must receive proper training in how to safely handle and store the hazardous products they use.

Taan has created a WHMIS module (below), to ensure workers have the information instruction and training to safely work with controlled products. This module provides workers with the information they'll need to:

- Identify
- safely handle
- store and,
- reduce their risks of exposure to these products

WHIMIS Training

These procedures have been updated to reflect changes to the Workplace Hazardous Materials Information System (WHMIS) to align with the Globally Harmonized System of classification and labelling of chemicals (GHS). More information on WHMIS 2015 can be found on the CCOHS website. Be aware that there will be a transition period where you may see both "MSDS" and "SDS" or old hazard symbols (circle border) and new pictograms (diamond border, see below).

Workplace Hazardous Materials Information System (WHMIS) training is required for all workers that handle or transport hazardous materials in the workplace. The information provided below satisfies the training requirements (i.e., by reviewing this procedure, you are considered to have been trained in WHMIS).

Federal legislation establishes which products are controlled under WHMIS, while provincial legislation covers the use of hazardous materials in the workplace and identifies responsibilities. Hazardous materials are referred to as "Controlled Products" and under WHMIS 2015, they are referred to as "Hazardous Products".

Periodic evaluation of the level of knowledge of the workers is completed regular during Lodge Inspections (CMS Lodge Facility Inspection Form) and periodically by Supervisors (undocumented).

WHMIS has six **classes** of Controlled Products:

Class A: Compressed Gas

Class B: Flammable and Combustible Material

Class C: Oxidizing Material

Class D: Poisonous/ Infectious

Sub Class D1: Material Causing Immediate and Serious Toxic Affects

Sub Class D2: Materials Causing other Toxic Effects

Sub Class D3: Biohazardous Infectious Material

Class E: Corrosive

Class F: Dangerously Reactive Material

Supplier Labels are placed on all containers of controlled products and are created by the supplier. Seven items must be included within the distinctive hatched border of any colour, except orange:

- Product Identifier
- Hazard Symbol
- Risk Phrases
- Precautionary Statements
- First Aid Measures
- Supplier identification
- Reference to MSDS

Smaller Containers (<100ml) require items 1, 2, 3 only

Workplace labels are required on containers for each Controlled Product produced and used on site; on secondary containers after a Controlled Product has been transferred from the original container and; on containers where the supplier label is missing or not legible Workplace labels provide three types of information:

- Product Identifier
- Specific safe handling information and personal protective clothing and equipment required
- Reference to the MSDS

Identification labels may be used as another means of labelling. Identification such as Colour, Numbers and Letters can be used as long as the identification system is communicated effectively and understood by workers

Material Safety Data Sheets (MSDS)

WHMIS requires information in nine sections within the MSDS. Many suppliers develop MSDS's with more than nine sections, however, each MSDS must have the following sections:

Product Information	Fire and Explosion Hazard	Preventative Measures

Hazardous Ingredients	Reactivity Data	First Aid Measures
Physical Data	Toxicological Properties	Preparation Measures

MSDS are provided by the supplier of the product. Note that MSDS contain a specific date and the MSDS expires after three years from the date printed on the MSDS.

WHMIS 2015

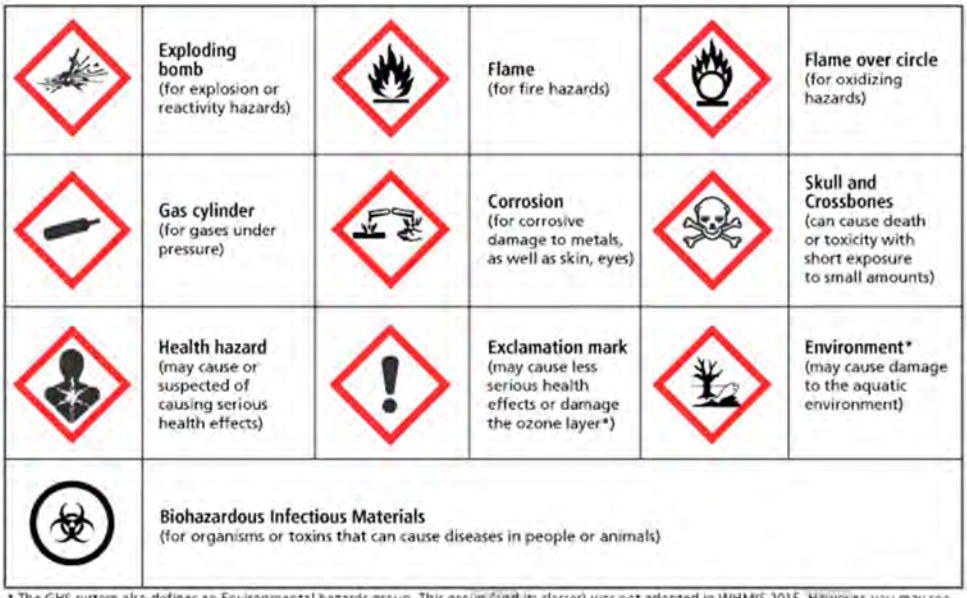
WHMIS has Physical Hazard Classes (20) and Health Hazard Classes (12) of Hazardous Products:

Physical Hazard Classes		Health Hazard Classes	
Explosives	Self-heating Substances	Acute toxicity	Reproductive Toxicity
Flammable Gasses	Substances when mixed with water emit flammable gases	Skin Corrosion/ Irritation	Specific Target Organ Toxicity – Single Exposure
Flammable Aerosols	Oxidizing Liquids	Serious Eye Damage/ Eye Irritation	Specific Target Organ Toxicity – Repeated Exposure
Oxidizing Gasses	Oxidizing Solids	Respiratory or Skin Sensitization	Aspiration Hazard
Gasses Under Pressure	Organic Peroxides	Germ Cell Mutagenicity	Biohazard Infectious Materials
Flammable Liquids	Corrosive to Metal	Carcinogenicity	Other
Flammable Solids	Combustible Dusts		
Self-reactive Substances	Simple Asphyxiates		
Pyrophoric Liquids	Pyrophoric Gases		
Pyrophoric Solid	Other		

Each hazard class has at least one hazard category that tells you how hazardous the product is. Category 1 is the highest hazard, with decreasing hazard as the category number increases (i.e., 2 is higher hazard than 3). Sub-categories may also be used (e.g., 1A, 1B).

Pictograms

Pictograms are graphic images that immediately show the user of a hazardous product what type of hazard is present.



	Exploding bomb (for explosion or reactivity hazards)		**Flame** (for fire hazards)		**Flame over circle** (for oxidizing hazards)
	Gas cylinder (for gases under pressure)		**Corrosion** (for corrosive damage to metals, as well as skin, eyes)		**Skull and Crossbones** (can cause death or toxicity with short exposure to small amounts)
	Health hazard (may cause or suspected of causing serious health effects)		**Exclamation mark** (may cause less serious health effects or damage the ozone layer*)		**Environment*** (may cause damage to the aquatic environment)
	Biohazardous Infectious Materials (for organisms or toxins that can cause diseases in people or animals)				

* The GHS system also defines an Environmental hazards group. This group (and its classes) was not adopted in WHMIS 2015. However, you may see the environmental classes listed on labels and Safety Data Sheets (SDSs). Including information about environmental hazards is allowed by WHMIS 2015.

Supplier Labels

Supplier labels are placed on all containers of controlled products and are created by the supplier. Seven items must be included within the distinctive hatched border of any color, except orange:

- Product Identifier
- Supplier Identification **Smaller**
- Hazard Symbol **these 4 items only**
- Signal Word (Hazard or Danger)
- Hazard Statement
- Precautionary Statement
- Supplemental Information

Containers (<100ml) require

Hazard statements are short standardized phrases that describe the hazard. Examples include:

- Extremely flammable gas
- Contains gas under pressure; may explode if heated
- Fatal if inhaled
- Causes eye irritation
- May cause cancer

There are 5 types of precautionary statements

1. General
2. Prevention
3. Response (including first aid)
4. Storage

5. Disposal

Examples include: Keep container tightly closed; Wear protective gloves/protective clothing/eye protection/face protection; If exposed or concerned: Get medical advice/attention; Fight fire remotely due to the risk of explosion; Protect from sunlight

Workplace Labels

- Workplace labels are required on containers for each controlled product produced and used on site; on secondary containers after a controlled product has been transferred from the original container; and on containers where the supplier label is missing or not legible.

- Workplace labels provide three types of information:
- Product identifier
- Specific safe handling information, PPE and equipment required
- Reference to the SDS
- Identification labels may be used as another means of labeling. Identification such as color, numbers and letters can be used as long as the identification system is communicated effectively and understood by workers.

Safety Data Sheets (SDS)

All workers must be aware of the location of SDS (e.g., provided via printed copies or on-line database).

Printed copies of MSDS are also provided by the supplier of the product.

Note that MSDS contain a specific date and the MSDS expires after three years from the date printed on the MSDS.

WHMIS requires the following minimum information in 16 sections within the SDS:

1. Product Identification
2. Hazard Identification
3. Ingredients (composition/ info)
4. First Aid Measures
5. Fire Fighting Measures
6. Accidental Release Measures
7. Handling & Storage
8. Exposure Controls/ PPE
9. Physical & Chemical Properties
10. Stability & Reactivity
11. Toxicology Information
12. Ecological Information
13. Disposal Considerations
14. Transport Information
15. Regulatory Information
16. Other Information

Other Controlled Product Training

Dangerous Goods

Dangerous Goods are defined in the transportation of Dangerous Goods (TDG) Regulations and Part 2 of the regulation and in schedules 1 and 3.

The purpose of the TDG regulations are to promote safety when dangerous goods are being handled and transported. Common products that would fall under the governance of the TDG regulations are:

- gasoline
- diesel • explosives.
- propane

Transportation of Dangerous Goods (TDG) training will be provided to workers that handle products identified in the TDG regulations.

Personal Protective Equipment

Personal Protective Equipment (PPE) is designed for worker safety, but must be utilized correctly to prevent incident or injury.

All PPE must meet regulatory and Canadian Standards Association or other permitted standards (refer to the WorkSafe website for details).

Employees and Contractors must periodically inspect their PPE to ensure it is in good working condition. Defective PPE must be replaced prior to starting work.

PPE must be available and utilized while on Taan Tenures and all active worksites:

- Hi-vis hard hat preferred orange or yellow (shells to have no damage and minimum sun fading, liners recommended to be changed annually; to be worn at all times when on Taan Tenures, dryland sort, and all active work sites regardless of Taan ownership or responsibility. Exceptions: driving in vehicle, working in a piece of machinery with a roof and rollover protection or a Taan supervisor deems a site to have no overhead hazards (i.e., middle of post-harvest cut block with no machinery around or chance of windfall from neighboring trees). Chin straps when working at heights or in high winds, etc.
- Hi-vis shirts, jackets, sweaters and/or vest must be worn at all times while on Taan Tenures, dry land sorts, and all active work sites regardless of Taan ownership or responsibility.
- Safety boots with toe protection, to be worn at all times when on Taan Tenures, dryland sort, and all active work sites regardless of Taan ownership or responsibility. Must be of a design, construction and material appropriate to the protection required for the work environment and appropriate for the hazard (and meet applicable CSA or other standards). Caulked boots are required for walking on logs (not required to be steel toe).
- Safety glasses, to be worn any time an eye injury could exist (meeting CSA standard) and recommended in high dust areas such as DLSs. Brush screens are recommended where eye injury potential or brush is above waist. Eye glasses are not permitted to be used as safety glasses if there is potential for glass to break and damage the eye.
- Safety Pants / Leg Protection, to be worn when using a power saw (leg protection must meet WorkSafe BC PPE regulation requirements of 4100 minimum chain speed).
- Hearing protection, where applicable (where noise levels >85 decibels).
- Gloves, where applicable (e.g., welding, cutting/grinding, handling chains/ lines).
- Life vests are to be worn when working on booms, near water or travelling in small vessels. Life vest are not required to be worn when travelling in crew boats but must be readily available.
- Respirators, when potentially exposed to harmful fumes (e.g., paint, solvent, brake dust). There are specific legal requirements regarding training, fit testing and use of respirators.

- Carry a personal First Aid Kit, as required.
- Carry a whistle and radio if working alone or in isolation from the rest of the crew. Use of "Inreach" for check-ins is mandatory when working alone for planning dept.

Taan Employee Daily Check-in Procedures

All employees must sign out/ in on the posted whiteboard on a daily basis.

If you are not planning on being in the office in the morning (e.g., going direct to a worksite or off/ sick), you must communicate with your Supervisor to ensure that your information gets posted to the board. Record the date, location (in order of where you will be working if in several locations) and the time you expect to be back at the office. Ensure that you also discuss your workplans with your Supervisor.
If you are not able to return by your posted time, then you must contact your Supervisor via phone, radio (QCR repeater channel), radio phone or "inreach".
If you miss your end of day check in and have not made contact, the Supervisor will implement the working alone check in procedures for a missed check in (below).

Working Alone Check-in Procedures

Avoid working alone whenever possible.

If it is necessary to work alone, arrange for check-ins to be completed. Sign out on the white board as above and include the individual who will be checking you in. Ensure this individual knows your plans and that they are you designated check-in. Check-ins are to be documented by the checker. The interval between check-ins is not to exceed 2.5 hours.

- Utilizing an "Inreach" check-in using checkin@taanforest.com
- All Taan supervisors will receive this message
- Designated check-in person records on white board that check-in is complete and next expected check-in time
- At end of day, when on highway utilize checkout@taanforest.com or another method of communication to ensure your check-in person knows you are safe and on your way back to office

In the event a check is not answered, the checker will call every five minutes for 30 minutes and if there is still no contact after 30 minutes, the checker will call a Supervisor, or crew in close proximity, to go to the site and confirm the worker is alright.

If boating alone, ensure have a designated check in person and a check in schedule. All checkins must be recorded. If a check in is missed notify Taan management immediately.

Refusal of Unsafe Work

Every worker has the right and responsibility to refuse unsafe work that they believe would create an undue hazard to themselves or others. An undue hazard is "a thing or condition that may expose a worker to an excessive or unwarranted risk of injury or occupational disease" The following steps will be taken in trying to resolve the issue:

- If worker believes there is an undue hazard, he/ she must immediately report the circumstances of the unsafe condition to his/ her Supervisor.

- A Supervisor or employer receiving a report must immediately investigate the matter.
- The Supervisor must ensure that any unsafe condition is remedied without delay.

If, in the Supervisor's opinion, the report is not valid, he must inform the person who made the report. If the matter is not resolved, the Supervisor or employer must investigate the matter in the presence of the worker who made the report and any other reasonably available worker. If the matter is still not resolved, the Supervisor or employer and the worker must immediately notify a Board Officer, who must investigate without undue delay. A worker will not be subjected to any discriminatory action.

Correction of Unsafe Work Conditions

Consistent with WorkSafe BC requirements, all unsafe or harmful conditions found in the course of an inspection or raised by an employee or contractor must be remedied without delay. Inspections and action plans to address deficiencies or issues are documented using the appropriate CMS Inspection Checklist.

Entry into Confined Spaces

Confined spaces may exist in some pieces of equipment (e.g., machine compartments, barges).

Do not enter a confined space unless you are properly trained. For high hazard areas, the Supervisor must complete an Entry Permit and post at the point of entry (retain a copy of the permit on file).

Before entering confined spaces, entry hazards must be identified and precautions must be taken (e.g., testing for gasses, adequate ventilation, pre-work meeting to review hazards, etc.). Ensure that regular communication takes place with the worker in the confined space.

If the work activity generates air contaminants (e.g., toxic fumes, smoke and carbon monoxide) additional equipment, controls and procedures may be required. Additional PPE, such as life lines/ safety belts and respiratory protection may be required.

Do not attempt to rescue any injured workers within a confined space unless there is at least one person that is available to remain outside the space and monitor/ assist the rescuer(s).

Fall Protection

If you are required to work from a height ≥3m (10ft) and no guard rails are present, ensure that you d contact your Supervisor to determine what will be required to complete the work safely (e.g., training and equipment).

- In addition to the PPE requirements noted above, WorkSafe BC also requires fall protection measures and safety equipment (restraint/ arrest system) when work is being completed at heights ≥ 3m (10ft) and no hand rails are present, or at any height where there is an unusual risk of injury. Temporary anchors used with lanyards or lifelines must meet a load capacity of 800lbs or 4 times the weight of the worker, whichever is greater (in any direction from which a load may be applied). Lanyards and safety belts must meet CSA Standards and all snap hooks must be self-locking.
- Ensure fall protection equipment is stored in containers/ bags to ensure protected from substances and conditions that could contribute to their deterioration.
- When mobile equipment is used, guard rails must be used (where practical) and permanent

anchorage fittings at strategic points (where work will occur and risk of fall ≥3m) must meet the minimum strength specified in the OH&S Regulation. Signage must be in place at all access points.

Musculoskeletal Injury (MSI) & Overexertion

Never lift, pull or carry any object that you are not safely capable of managing. Get help where necessary.

Pulling

- Keep your feet shoulder width apart. Keep your hands out in front of your body
- Grip the line or object firmly to avoid slipping.
- Keep your back locked out while pulling. Use your whole body to pull, not just your arms. Avoid twisting or jerking motions.

Lifting

- Take a minute to stretch/warm up before any repetitive or heavy lifting jobs.
- Place your feet apart for good balance.
- Bend and lift with your legs (avoid lifting with your back). Keep the load close to the center of your body. Lift gradually, smoothly and without jerking. Do not twist your back while lifting. Pivot your feet instead.
- Coordinate your lift with your partner, where appropriate.

Sprains and Strains

- Manual handling, especially in storage areas, can lead to over exertion injuries and sprains and strains. To reduce the risk of injury:
- Stack items in a stable manner, all materials must be stacked or stored in a manner that permits safe access to and egress from a work area.
- Organize storage areas by weight, with the heaviest items between knee and chest level to minimize lifting.
- Use a ladder or step stool to reach items on higher shelves.
- Use proper lifting techniques and dollies whenever possible.
- Ensure that you have a clear view of your route when carrying materials.

Vehicle Transportation

- Drivers are responsible for the vehicle and the safety of all passengers. It is your duty to be alert at the wheel, to be able to cope with unexpected situations, and know the vehicle and its capabilities.
- Use of seatbelts is mandatory.
- Drive with headlights on at all times, this includes tail lights. Windows and headlights should be clean.

- Do not drive by the radio.
- Expect the unexpected around every corner; keep tight to the right side on all corners and drive on your side of the road at all times.
- Drive the posted speed limit – do not exceed 60 m/hr on logging roads; slow down according to road conditions and weather.
- Logging trucks have the right of way. Use pull outs to get into the clear – avoid using pull outs on the outside corners. When trucks call "loaded long" be sure to use only pull outs on inside corners or straight sections.
- Keep loose gear and equipment secure inside the cab of the vehicle.
- Slow down to 10 km/hr when passing work crews. Always get clearance from operators if passing machines, including graders.
- It is a good practice to park vehicles pointed towards camp.
- Report maintenance issues in a timely manner. Ensure first aid kits are replenished as required.
- Report all observed unsafe driving to the vehicle driver and Supervisor.
- When turning the vehicle around always back toward the cutbank. Use a spotter in difficult areas.
- Prior to backing up, ensure that you have clear knowledge of obstacles in the vicinity (e.g., trees, logs, buildings, curbs, etc.).
- Follow the Taan Radio Call Procedures when on Logging Roads (See Radio Call Procedure appendix).
- Vehicle insurance is not required (but is recommended) for off-road use (road permit or FSR). It is required on all public roads and highways, including road crossings. Refer to your contract for additional insurance requirements.

Small Trailer or Boat Towing

- Conduct pre-trip inspection of tires, signal lights, tail lights, brake lights, braking system function, safety chains and hooks, tie downs, registration papers, tie down points and decks.
- Verify load is under trailer GVW and that the towing vehicle has correct towing capacity for loaded trailer.
- Once hitched, verify function of lights and brakes. Travel 500 m or less and re-check the hitch.
- Drive a safe speed that considers the load, weather and road conditions. If trailer begins to fishtail back off speed.
- Conduct post trip inspection and rectify deficiencies prior to next trip.

Radio Call Procedures

Refer to Appendix 1 for Radio Calling Procedures and radio frequencies for each area.

Portable Radio Use

It is each employees responsibility to ensure any radio you are assigned to use is working and the batteries are fully charged prior to each use.
Use waterproof containers for protection from the weather.

Perform a radio check before working in new areas.

In situations where extended range transmissions are required use QCR and/or marine 6 (marine 6 is a last resort).

To make a phone call using a handheld or truck mounted radio, follow these steps: (you must have a keypad)

1. switch to the QCR repeater
2. Press and hold the transmit button and the * button (once), then release the transmit and listen for the dial tone
3. Once you hear the dial tone, press and hold the transmit button, and use the keypad to dial the phone number
4. Push the transmit button to talk (keep in mind everyone on the QCR will be able to hear the conversation)
5. To end the call, press and hold the transmit button and the # button. Listen for the disconnect tone.

To call BC Ambulance on QCR or QCR CC, follow these steps: (you must have a keypad)

1. Switch the radio to QCR or QCR CC
2. Press the transmit button 5 times
3. Or press the 1 and the * buttons
4. To end the call, press #

Air Transportation

- Inform pilot of local hazards (i.e. blasting, equipment location).
- During air transportation, all passengers and personnel are to follow the directions of the Pilot. The Pilot is responsible to direct activities in and around the aircraft, including but not limited to: delivery of safety briefings; filing of proposed flight paths; management of loading and landing zones; directing entry and exit; and controlling loading. Find out if caulk boots are allowed to be worn in the helicopter.
- Helicopter use - the Pilot and the field crews must have a map of the area indicating where helipads are located. Ensure heli-pads are safe for use.
- Never approach or leave a helicopter from the rear. Always from the front, in full visibility of the pilot. Approach or exit a helicopter only after a signal from the pilot.
- When unloading gear, place heavy items on the ground beside machine, walk away into the clear and wait for helicopter to leave prior to retrieving gear.
- Secure loose clothing and objects around the landing area that could become airborne during take-off or landing.
- When working in remote locations, complete a radio check with the pilot before they leave the area.

Water Transportation

- All crew boat Operators must be adequately trained (refer to the Training Matrix).
- The boat must be kept in good operating condition. Follow the manufacturer's recommended maintenance schedule. Report and address any issues immediately.
- Use only paints approved for marine use.
- Maintain good housekeeping. Never throw garbage overboard. Report any observed pollution.
- Keep bilge clean and do not pump oily water overboard. Keep sewage in a holding tank.
- All safety equipment on board must be in good working order, easily accessible and maintained and replaced in accordance with the manufacturer's instructions or recommendations. Refer to the EPRP Supplemental for details.
- Copies of marine charts for the area of operation must be on board.
- For every trip, a sail plan detailing the travel route and number of persons on board must be left with a designated check in person. Where it is not possible to report a sail plan to a person on shore, the information for must be left in a known, and readily available, location.
- Towing another boat is only permitted in emergency situations.
- In the event of a fall overboard or capsize, do everything you can to save your energy and body heat. Swim only if you can join others or reach safety. Do not swim to keep warm.

Boat Operators

- Ensure you complete a daily pre-trip inspection and safety briefing with all passengers (refer to the EPRP Supplemental for details).
- Check weather reports (marine forecasts) and tides to ensure weather will not impact the trip. Monitor weather throughout the trip. Be prepared to return early if necessary. Do not operate the boat in the dark, during high winds or heavy fog.
- Be familiar with the boats limitations and handling. Do not overload and store cargo securely. Place people and cargo evenly.
- Always operate at a safe speed. Slowdown in poor weather or water conditions or where there are navigational hazards such as rocks and tree stumps. Avoid sharp turns.
- Avoid shoreline erosion – watch your wake and propeller wash.
- Always remain alert and aware of surroundings and other vessel traffic. Be ready to yield to large vessels.

Walking in the Woods

- Before you take a step, look ahead, identify the potential hazards and be aware of the conditions of the ground (e.g., wet, slippery, potholes etc.). Move cautiously and ensure good footing before you move forward
- Watch out for hazards: rotten windfalls, small saplings, loose material, hidden holes, recent slides, creek crossings, heavy brush, heavy loose slash, recent burns, snow, steep slopes, loose boulders, steep and slippery ramps, frozen logs etc.

- Never jump off logs, rocks, creek banks etc.
- Exercise extreme caution when walking on bare rock around creeks and bluffs.
- If a route becomes too hazardous or difficult, retrace the path to find a safer route.
- In snow and ice conditions, be aware of the hazard of “tobogganing” down steep slippery slopes towards drop offs after a fall. This is especially hazardous with raingear on.
- Walk far enough behind to avoid being slapped by deflected branches or sliding into your partner or vice versa (minimum 3m).
- Use safety glasses in brushy or hazardous areas.
- Visually assess your path and take the safest route; do not cross canyons on walk logs high above the ground.
- Do not assume that the ground is stable. If unsure, test foot and hand holds' first for stability before applying full weight.
- Ensure that you leave sufficient time to walk out of an area at the end of the day safely, don't get caught short of time.
- When working in areas where you must be flown in and out by Helicopter you must ensure you have a plan and route you can walk out on if the Helicopter cannot return to pick you up.
- During windy weather, consider making alternate plans (e.g., office work, alternate areas).
- Use extreme caution when working in areas that require you to cross creeks or rivers. Before crossing, determine the strength and flow and find a safe easy route and make sure you are going to be able to get back across at the end of the day if inclement weather causes the creek to rise. Do not use windfalls as bridges over gullies and creeks if they span over a 3m drop or a fall will result in harm.
- Ensure good footing when walking on steep slopes. Never ascend or descend steep areas with another worker downslope in case loose material is dislodged. When walking a side hill, carry equipment in the down-hill hand, if you should fall, throw all equipment you are packing away from you.
- In the event you become lost in the woods, stay where you are. Attempt to make contact with the office and/ or you check in person.

Bear Safety

Watch for signs of bears, such as droppings, fresh tracks or their strong sent.
Carry a noise maker such as a bell and make your presence known by talking loudly, clapping, singing or occasionally calling out, particularly in areas with poor visibility, where bear signs are evident and where noises are muffled such as along rivers and streams.
Be careful near berry patches, heavy brush and streams where salmon are spawning.
Never approach a bear or a freshly killed animal.
Don't leave food or food debris lying around.
If you see a bear, leave the area immediately BUT, move slowly, do not run. Choose your escape route carefully- never get between a mother and her cubs.
Avoid direct eye contact with the bear; the bear sees eye contact as a form of aggression.
Pepper spray is found to be effective in some circumstances. It should not be considered a guaranteed

form of protection or a substitute for safe habits in the wilderness. Bear spray must be transported in a protective case and stored in the cargo hold when traveling in a helicopter or pickup. Tell the pilot and others that bear spray is being carried.
If you are attacked by a black bear:

- Do not run.
- If the attack lasts for more than a few seconds, respond aggressively- use sticks, rocks, your fists or noise.
- Black bears will sometimes back off if they are challenged.

Operating Hand Tools

Ensure guards are in place and functioning properly. Ensure tools are free of damage. Wear appropriate PPE. Be aware of kick-backs, cut pieces, etc.
Axes must be sheathed at all times. Ensure in good condition and parts secure. Use appropriate stance and ensure solid footing.
Only a trained person may operate a power saw. Wear gloves and eye protection when filing. File tangs must be bent over, or use a handle. Only a certified faller may fall trees greater than 15cm in diameter (6 inches).

- During welding, ensure those around you are aware of the safety hazards of the ultraviolet light; avoid eye contact without proper protection. Ensure oxy/ acetylene tanks, hoses and fittings are properly secured. Ensure cylinders are protected from sparks, flames, excessive heat, physical damage, electrical contact and corrosion. Ensure cylinders are equipped with a pressure release mechanism.
- Oxygen is not to be used to operate a pneumatic tool, start an internal combustion engine, clean equipment or clothing, create pressure in a container or ventilate a workplace.
- Ensure hoses are not damaged or leaking; replace worn hoses.
- Watch for sparks and be aware of where they are landing (ensure no immediate fire hazard).

Operating Equipment
Check to see that other workers are in the clear before starting, or re-starting equipment, and moving materials. Always conduct checks when reversing the machine. Continuously reexamine the worksite when working on steep slopes; adverse weather can change the working conditions.

Use three-point contact and use steps/ ladders when exiting or entering equipment.

No unauthorized passengers on equipment (trainees are permitted).

Shut down and properly lock-out equipment prior to servicing. Never try to use equipment that has been locked-out.

Watch for machine footing problems such as rock pinnacles, slippery soils, smooth rock surfaces or greasy logs. These items can cause the machine to pivot unexpectedly. Maintain a safe working distance from other machines or crews. Replace all equipment guards, and promptly report all missing guards to your Supervisor.

Take hand signals from only one person at a time; take “Stop” signal from anyone.

When travelling, call kilometres and communicate with other road traffic. Do not drive by the radio;

expect traffic at every corner.
When lifting heavy material, know the capability of the machine, especially on steep side slopes. Use extra caution when handling logs, especially longer logs, which may pivot. Deck logs so that piles are stable.

When pulling material towards the machine, watch that it is not propelled into the cab.

Park the machine in the clear of any hazards (e.g., high cut banks, rock faces, potential windfall timber, unstable fills, etc.).
When leaving the machine, lower the boom.

When moving equipment, ensure all moving part are secure.

When working near water maintain clear communication with other workers and vessels. Watch for blind spots.

When operating a crane or hoist, ensure they are certified or inspected by a Certified Professional as required by WorkSafe BC and required training has been completed.

Working in Active Areas

Before entering any active area, you must contact the person identified on the signage (e.g., barricade sign, prime contractor sign) and obtain clearance prior to entry.
For clearance around active machinery, ensure you obtain verbal clearance from the machine operator before proceeding.
If you plan to work in the area for any extended amount of time, ensure you communicate work plans with the operator and/ or Supervisor. Notify them of any changes to the "plan".
Notify applicable persons when you are leaving the area.
In Dryland Sorts, obtain clearance from the Supervisor. Be aware of the location of moving equipment at all times.
At no time is a gate or barricade to be passed without prior approval form the main site contact.

Blasting Signals

Preceding the blast, 12 short whistle signals must be sounded at one second intervals.
Two minutes must elapse after the last warning signal before initiating the blast.
Following the blast and after the area has been examined and found safe, one prolonged whistle signal of at least five seconds duration must be sounded, to signify that permission is granted to return to the blast site.

Cranes/ Hoists

The Occupational Health & Safety Regulation (OHSR) includes some very specific requirements related to the use, maintenance and inspections of cranes and hoists. In addition, the Regulation also references various CSA and ASME standards. The following is a general summary of the key requirements:

- Be aware that some specific types of cranes and hoists may only be operated by certified operators (i.e., mobile crane, tower crane or boom truck). All other operators must be qualified and have been instructed on how to operate the equipment.

- Each type of crane/ hoist must have a copy of the Manufacturers Manual or instructions provided by a Professional Engineer available on-site to the workers at all times. Be aware of all load and operating limits as well as the safe work procedures/ JSBs.
- A crane or hoist must be permanently identified by the legible display of the manufacturers name, model and serial number on the structure. The rated capacity (or load chart for movable parts) must be permanently indicated on the superstructure, hoist and load block of the equipment.
- As part of the maintenance program, some pieces of the crane/ hoist require calibration at intervals specified by the manufacturer; maintenance is also required if there is any indication they are not working properly (i.e., load weighing device, load moment indicator, overload prevention system). Records of calibration must be retained.
- Maintenance or repair must be completed by, or under the direct supervision of, a qualified person. Any repair to load bearing components must be certified by a Professional Engineer or the original manufacturer. The record must also contain an entry signed by the person responsible for any test, inspection, modification, repair or maintenance performed on the equipment, summarizing the work done, indicating the status of the equipment or machine for further use, and if appropriate, noting where a detailed record of the test, inspection, modification, repair or maintenance can be obtained.

Inspection Requirements

Consult the Owner's Manual for specific inspection and maintenance requirements (or a Professional Engineer).

Each crane and hoist must be inspected and maintained at a frequency and to the extent required to ensure that every component is capable of carrying out its original design and function with an adequate margin of safety.

All Inspections must be documented (log book, records system or sticker). Any defects must also be recorded and reported to the Supervisor immediately. The crane/ hoist must not be used until the defect has been remedied.

The following minimum inspection frequency applies:

- Each Shift: pre-use inspection completed by a designated individual familiar with the equipment, documented in the log book (including testing of control and safety devices). Record any deficiencies or need for maintenance. Where straps/ chains/ slings are used, they must also be inspected. For log truck reloads, it is recommended that the pre-use inspection is completed by designated Shop personnel rather than the first truck driver of the day.
- Annual: Certification for all cranes, hoists, mobile cranes and boom trucks (by a Certified Inspector).

The following additional "special" Inspection requirements apply:

- New/ initial use following installation, major repair or re-build (or out of service) must have inspections completed by a Certified Inspector, prior to use.
- A crane boom used with a vibratory hammer (e.g., driving piles) must be inspected at least once every three months by a Certified Inspector.

- If a crane or hoist is used to lift a heavier load than rated/ certified for, or there is an incident affecting the potential safe use, it must be inspected by a Certified Inspector prior to re-use. Inspection must be documented (log book, records system or sticker).

Forest and Road Inspections and Maintenance procedures are outlined in the Planning SOP.

Cultural Features Chance Finds

In the event that any potential artifacts or archeological sites are encountered (e.g., arrow heads, obsidian flakes, middens, pictographs etc.), stop work immediately and notify the Supervisor (who will notify a Taan Representative).

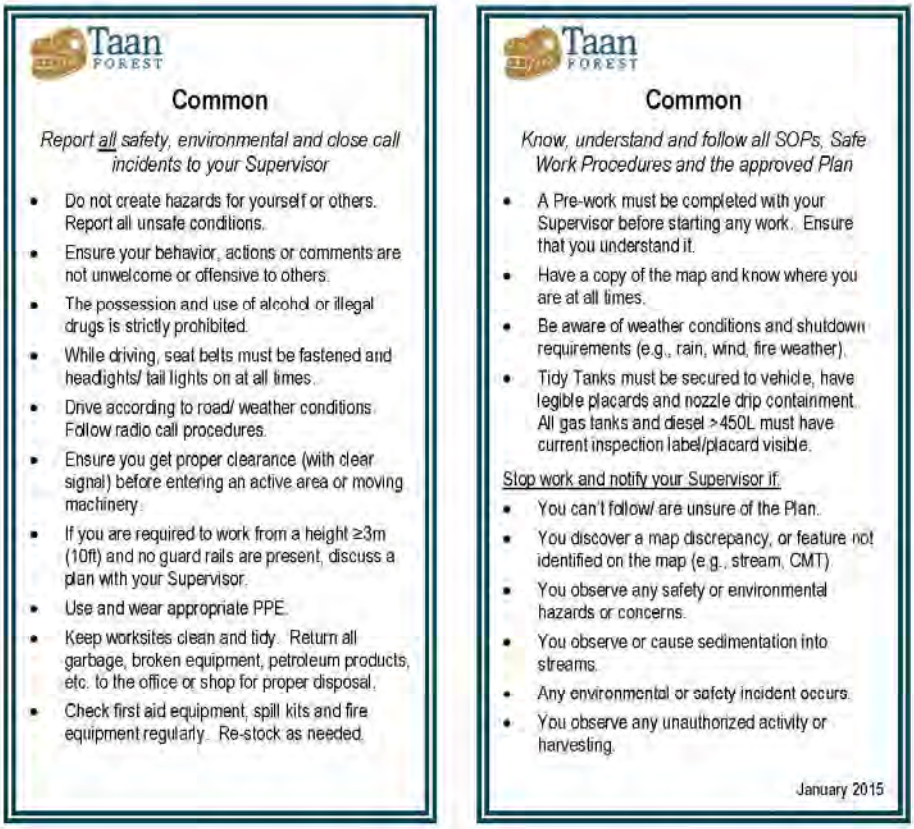
Do not disturb the find. Record the location with a GPS and take photos with an item for scale, if possible.

Taan will notify the Council of the Haida Nation (CHN) and engage a professional archaeologist. When the archeologist (or trained Taan Supervisor) is assessing or removing an item, the CHN Artifact Procedures must be followed.

If human remains are found, Taan and the Archeologist will notify the RCMP and take further actions, as required.

For more information, refer to the Taan Cultural Heritage Features Operations Reference Field Card and the Taan Archaeological Chance Find Management Plan.

Appendix X: SOP – Common Field Card



Taan FOREST

Common

Report all safety, environmental and close call incidents to your Supervisor

- Do not create hazards for yourself or others. Report all unsafe conditions.
- Ensure your behavior, actions or comments are not unwelcome or offensive to others.
- The possession and use of alcohol or illegal drugs is strictly prohibited.
- While driving, seat belts must be fastened and headlights/ tail lights on at all times.
- Drive according to road/ weather conditions. Follow radio call procedures.
- Ensure you get proper clearance (with clear signal) before entering an active area or moving machinery.
- If you are required to work from a height ≥3m (10ft) and no guard rails are present, discuss a plan with your Supervisor.
- Use and wear appropriate PPE.
- Keep worksites clean and tidy. Return all garbage, broken equipment, petroleum products, etc. to the office or shop for proper disposal.
- Check first aid equipment, spill kits and fire equipment regularly. Re-stock as needed.

Taan FOREST

Common

Know, understand and follow all SOPs, Safe Work Procedures and the approved Plan

- A Pre-work must be completed with your Supervisor before starting any work. Ensure that you understand it.
- Have a copy of the map and know where you are at all times.
- Be aware of weather conditions and shutdown requirements (e.g., rain, wind, fire weather).
- Tidy Tanks must be secured to vehicle, have legible placards and nozzle drip containment. All gas tanks and diesel >450L must have current inspection label/placard visible.

Stop work and notify your Supervisor if:

- You can't follow/ are unsure of the Plan.
- You discover a map discrepancy, or feature not identified on the map (e.g., stream, CMT).
- You observe any safety or environmental hazards or concerns.
- You observe or cause sedimentation into streams.
- Any environmental or safety incident occurs.
- You observe any unauthorized activity or harvesting.

January 2015

Instructions: White Paper, 2 sided printing. Cut to 5.75x3 inches. Laminate and grommet at bottom.