APPENDIX B

Standards for Forest Management, North Chamberlain Conservation Easement

ROAD MANAGEMENT

1. The initial baseline for roads and their location will be North Chamberlain Conservation Easement Baseline Map as exists on July 1, 2009 (See attached Figure 1). For the purposes of this agreement, road density will be calculated as the miles of road by road class (i.e., open, restricted and total) divided by the total area of the subject lands. For roads located within Riparian Management Zones (RMZ), road amounts will be tracked and reported in linear miles of road located within an RMZ.

2. DNRC will complete an inventory of roads within the first five years that lands are under their ownership to update the initial baseline map. Roads inventoried will be those that DNRC has legal access to and sole ownership of, or has entered into cost-share or reciprocal access agreements.

3. The information collected during the initial road inventory will be used to:

    a. Verify the location and class of each road segment included in the initial road baseline;
    b. Identify the location of additional road segments that were not included on the initial road baseline;
    c. Determine the class, condition, and sediment delivery status of each road segment;
    d. Verify the location, type, and effectiveness of closure structures included in the initial baseline;
    e. Identify the location and determine the effectiveness of additional closure structures that were not included in the initial baseline;
    f. Revise the initial baseline map used for the commitments contained in this conservation easement;
    g. Recalculate the open, restricted and total road densities, and the total linear miles of road located in RMZ that were used in the initial road baseline. Road densities will be calculated for the entire area covered by this agreement and linear miles of road will be calculated for the total miles of road located within all Riparian Management Zone (RMZ) area covered by this agreement.

4. Class of road is defined by the following:

    a. Open roads – Administratively open to the public for wheeled motorized use during any portion of the year.
    b. Restricted roads – Managed to limit the manner in which motorized vehicles may be used (except as provided for in #5, below). Restricted roads will have a physical barrier that restricts the general use of motorized vehicles. Administrative uses by the landowner or their agent(s) that are consistent with other measures in this document are allowed.

Barriers will be man-made or naturally occurring (e.g. gates, barricades, earthen berms, vegetation that makes the road impassable, eroded road prism, rocks, etc.).

c. Abandoned road – Impassible to motorized vehicles due to effective closure, but has drainage structures that have not been removed.
d. Reclaimed road – Impassable to motorized vehicles due to effective closure. It has been stabilized and culverts and other drainage structures if present have been removed, but the road prism may remain. Reclaimed roads will be re-vegetated (including soil preparation where necessary) with native vegetation consistent with the site, and made impassible for motorized vehicles through means such as ripping of road prisms, placement of root wads, boulders, slash/debris, and reforestation, etc.
e. Temporary road – A low-standard road that is used for forest management which, following use, will be reclaimed.
f. Total road density – Combined road density of both open and restricted road classes.

5. Licensed snowmobile use or use of other tracked over-the snow vehicles will be allowed from December 1 through March 31 on restricted roads within the agreement area (Figure 1). Winter use dates and authorized use areas may be altered upon mutual agreement of both parties. Individual roads may be temporarily or permanently restricted from winter use by the landowner for the purposes of human safety or resource protection.

6. Road condition – refers to whether a road segment meets Best Management Practices (BMPs) standards or requires improvements to meet BMP standards. These evaluations will also include an assessment of existing and potential sources of sediment delivery from roads to streams, and information necessary to develop site-specific corrections to meet BMP standards. For this agreement BMPs shall refer to those measures contained in Attachment A – Best Management Practices for Forestry in Montana.

7. Sediment delivery status – refers to inventoried road segments and stream crossing sites as being either:

a. Low risk of sediment delivery (meets BMPs and/or has very low risk of sediment delivery);
b. Moderate risk of sediment delivery (does not meet BMPs, has moderate risk of sediment delivery, or meets BMPs but is poorly located); or
c. High risk of sediment delivery (does not meet BMPs, is poorly located, is currently delivering sediment, or has high risk of future sediment delivery).

8. The Landowner will complete subsequent road inventories every 10 years from the completion of the initial inventory. The information collected during these subsequent inventories will be used to verify the class, condition and sediment delivery status of each road segment.

9. Commitments for road densities will be the following:

	Area	
Time period	**Property-wide (including RMZ)**	**RMZ**
Prior to the initial road inventory (up to 5 years)	-Allowance of 3 miles of temporary roads. -No increase in open and total road density.	Maintain or reduce open, and total road mileage.
After inventory	- Allowance of 3 miles of temporary roads. - Maintain or reduce open and total road density.	Target decrease in roads by class TBD.

10. The Landowner will provide for prior review of road building proposals by FWP. The purpose of such reviews shall be to help ensure compliance with the easement terms, not for the purpose of formal approval.

11. Landowner may construct and maintain up to 3 miles of temporary roads on the property covered by this easement to facilitate timber management activities. These roads will be built to minimum BMP standards and reclaimed within one year following completion of project-related activity, or within 5 years of construction, whichever comes first. Temporary roads will not be included in total road density calculations and will be closed to public access during their use. Following reclamation, the temporary roads shall not be usable or accessed for commercial, administrative or public motorized use.

12. Within one year following the completion of the road inventory and associated transportation planning, the Landowner will coordinate with FWP to develop a net reduction target for linear miles of roads located within RMZs.

13. The Landowner may change the class of roads through management actions, reclaim roads, or construct new roads only if the net effect of such actions does not increase open or total road densities on the lands covered under this agreement, or increase the total linear distance of open or total roads within RMZs. Reclaiming a road segment removes it from the density and mileage calculations.

14. The Landowner may temporarily close portions of any road(s) on lands covered under this agreement for the purpose of human safety without prior notification of FWP. Activities may include, but are not limited to: timber felling, hauling, road construction, road maintenance, culvert installations, fire management, etc.

15. For the property-wide calculation of road density, density shall be calculated as the miles of road by class (i.e., open, restricted, and total) divided by the total area of the subject lands. For the RMZ, road amounts will be calculated and tracked by the total linear miles of road located within all RMZs covered by this agreement.

ROAD BMP'S

16. Existing roads or newly constructed roads that are no longer needed for forest management will be reclaimed. Decisions made to reclaim roads will be based on the consideration of several

factors, including but not limited to: planned activities, desired future stand conditions, silvicultural objectives, infrastructure needs, cost, available resources, fire protection access needs, contractor availability and risk of sediment delivery to streams.

17. The Landowner shall inspect road closure structures, such as gates, barriers, and earth berms, at least every 5 years for effectiveness in restricting access. Effective closure is accomplished when a road is impassable to motorized vehicles. Landowner shall repair or modify ineffective closures within 1 year of discovering or being informed of their ineffectiveness by the landowner or their agent, the public, or FWP.

18. Project-level, site-specific corrective actions will be developed and implemented on sites identified as having a high risk of sediment delivery where the Landowner has legal access and has sole ownership. These sites would be improved to BMP standards and to reduce the risk of sediment delivery to streams to the extent practicable.

19. Corrective action will be completed on all sites identified as having high risk of sediment delivery within the first 15 years of the initiation of this agreement. The Landowner will provide FWP information regarding the progress toward meeting this timeline upon request. These projects will be contingent upon availability of grant or project level funding from timber sale projects.

20. The Landowner will work with other landowners and cooperators to address road segments with shared ownership that have been identified as having high risk of sediment delivery.

21. Road construction, re-construction and road maintenance activities will meet Forestry BMPs and incorporate site-specific mitigation measures to reduce the risk of sediment delivery to streams.

22. New road locations will avoid high hazard sites prone to mass failure as required in Montana Forestry BMPs (Attachment A-BMP III.A.4). When new road construction or reconstruction cannot be avoided on potentially unstable slopes, the Landowner will design and implement site-specific mitigation measures to reduce the risk of mass failure.

23. The Landowner will use existing roads located in Riparian Management Zones (RMZ) for commercial timber management purposes only if potential impacts to water quality and aquatic habitat can be adequately mitigated and road mileage caps are met. See attached Figure 1 - North Chamberlain Conservation Easement Baseline Map for location of identified roads situated within an RMZ. The Landowner will relocate roads outside of the RMZ when these impacts cannot be adequately mitigated and relocation is economically feasible and practical from a road layout and engineering perspective.

24. The Landowner will evaluate and consider the use of alternative yarding systems that minimize road needs if such systems are practical and economically feasible, and their use will meet immediate and foreseen future management objectives.

25. The Landowner will complete BMP audits and contract administration inspections to monitor the implementation and effectiveness of BMPs and other mitigation measures utilized to reduce risk

of sediment delivery to streams. The Landowner will notify FWP of scheduled BMP audits and other monitoring activities in order to allow for FWP participation in those activities. However, monitoring activities will not necessarily be rescheduled to accommodate FWP participation. The Landowner will provide FWP with updates on the results of all applicable monitoring activities.

TIMBER MANAGEMENT IN THE RIPARIAN MANAGEMENT ZONE

26. A Riparian Management Zone (RMZ) will be delineated whenever the Landowner plans timber harvest activities adjacent to streams located within the North Chamberlain Conservation Easement Area. Landowner will identify the RMZ at the time of the project proposal, and it will be displayed in a prior notice to the Department per the Conservation Easement.

27. The baseline for stream location and stream classification used for RMZ delineation will be the North Chamberlain Conservation Easement Baseline Map (see attached Figure 1). Changes to the baseline map (stream location and classification) may be necessary following field verification and project level assessments. FWP and the Landowner must agree to changes to the baseline map.

28. Timber harvest conducted in RMZs will be limited to the extent that no more than 16% of the RMZ acres within the Conservation Easement would be harvested within any 50-year period. Harvests above these levels would require prior approval from FWP. The amount of RMZ harvest will be calculated by determining the acres of a harvest unit that are located within a RMZ. Only treated RMZ acres are counted towards the cap.

29. All harvest (e.g., commercial, sanitation, for cable yarding corridors, or salvage) conducted in the RMZ will have a minimum 1-acre harvest unit boundary delineated and count towards the cap. All RMZ harvest requires prior review by FWP to assure compliance with the easement terms.

30. Width of the RMZ shall vary by stream class. Stream class definitions and associated RMZ width and no harvest buffers are as follows:

a. Class I with channel migration zone (CMZ) – Class I streams means a portion of stream that support fish, or a portion of stream that normally has surface flow during six months of the year or more, and that contributes surface flow to another stream, lake or other body of water.

   i. CMZ is defined as the width of the flood prone area at an elevation twice the maximum bankfull depth, or as identified in baseline surveys.

   ii. RMZ width – equal to the CMZ plus 120 feet slope distance measured perpendicular on each side of the CMZ.

   iii. No harvest buffer – equal to CMZ width plus 25 feet slope distance measured perpendicular on either side of the CMZ.

   iv. Timber harvest and retention – Timber harvest in the RMZ will retain shrubs and sub-merchantable trees to the fullest extent possible, and a minimum of 50% of the trees greater than or equal to 8 inches diameter breast height (dbh) on each side of the

stream or 10 trees per 100 foot segment, whichever is greater. Trees retained must be representative of the species and size of trees in the pre-harvest stand.

b. Class I without CMZ

   i. RMZ width – equal to 120 feet slope on each side of the stream and measured perpendicular from the normal high water mark.

   ii. No harvest buffer – equal to 25 feet on each side of the stream measured from the normal high water mark.

   iii. Timber harvest and retention – Timber harvest in the RMZ will retain shrubs and sub-merchantable tree to the fullest extent possible, and a minimum of 50% of the trees greater than or equal to 8 inches diameter breast height (dbh) on each side of the stream or 10 trees per 100 foot segment, whichever is greater. Trees retained must be representative of the species and size of trees in the pre-harvest stand.

c. Class II Stream– means a portion of a stream that does not support fish (at any time), normally has surface flow less than six months of the year, and contributes surface flow to another stream, lake or other body of water; or a portion of a stream that does not support fish, normally has surface flow during six months of the year or more, and does not contribute surface flow to another stream, lake or other body of water.

   i. RMZ width – equal to 50 feet slope distance on each side of the stream and measured perpendicular from the ordinary high water mark.

   ii. No harvest buffer – none.

   iii. Timber harvest and retention – Timber harvest in the RMZ will retain shrubs and sub-merchantable tree to the fullest extent possible, and a minimum of 50% of the trees greater than or equal to 8 inches diameter breast height (dbh) on each side of the stream or 5 trees per 100 foot segment, whichever is greater. Trees retained must be representative of the species and size of trees in the pre-harvest stand.

d. Class III Stream – means a portion of a stream that does not support fish (at any time), normally has surface flow during less than six months of the year, and rarely contributes surface flow to another stream, lake or other body of water.

   i. RMZ width – equal to 50 feet slope distance on each side of the stream and measured perpendicular from the normal high water mark.

   ii. No harvest buffer – none.

   iii. Timber and retention – Protect and leave shrubs and sub-merchantable tress.

31. Cable harvest systems may require corridors through the RMZ in order to fully suspend logs across a stream. In these situations there would be an exception to the no-harvest buffers that would allow cable corridors with a minimum spacing of 150 feet.

32. Removal of individual hazard trees will not count towards the cap. A hazard tree is any tree that poses a risk to public safety, roads, structures, property and other improvements. Public safety refers to situations that pose foreseeable risk of injury or death to a person.

TIMBER HARVEST BMPS

33. The Landowner will design and implement Forestry BMPs and other site specific mitigation measures to reduce the risk of sediment delivery to streams from timber harvest activities to the extent that is practical.
34. When timber harvests are conducted on potentially unstable slopes, the Landowner will modify harvest prescriptions and/or design and implement mitigation measures to avoid increasing the risk of mass failure.

35. Landowner contracts addressing timber harvest activities will include these standards, BMPs and other site-specific mitigation measures designed to avoid, minimize, or mitigate the risk of sediment delivery to streams.

36. The Landowner will administer actively occurring timber harvest activities on a weekly basis to ensure that contract specifications, BMPs, and other resource protection requirements are met.

37. On sites where practices implemented have resulted in unacceptable levels of impact to soil or water resources, appropriate mitigation and/or rehabilitation measures will be implemented by the Landowner as soon as possible. Examples of unacceptable levels of impact are major departures in BMPs resulting in actual sediment delivery to streams or a high risk of sediment delivery to streams.

38. The Landowner will complete BMP audits and contract administration inspections to monitor the implementation and effectiveness of BMPs and other mitigation measures utilized to reduce risk of sediment delivery to streams. The Landowner will notify FWP of scheduled BMP audits and other monitoring activities in order to allow FWP participation. Scheduling of audits and other monitoring will not necessarily be dependent on accommodating FWP participation. The Landowner will provide FWP with updates on the results of monitoring activities.

WILDLIFE PROTECTION

39. The Landowner shall limit forest management activities during the spring period in spring grizzly bear habitat as described below:

a. Spring grizzly bear habitat is defined as all habitat located below 4,900 feet elevation (see attached Figure 2 – North Chamberlain Conservation Easement Spring Grizzly Bear Habitat Map).

b. Spring period is defined as April 1 through June 15.

c. Forest management activities, including but not limited to timber harvest, salvage harvests, pre-commercial thinning, heavy equipment slash treatment, and road building are prohibited. Exception: forest management activities (including salvage harvests and pre-commercial thinning are allowed within 100 feet of an open road.

d. A total of 10 days of activity are allowed within the entirety of the subject lands during the spring period in spring habitat for the purposes of mechanical site preparation, road maintenance, and bridge replacement. Any combination of these three activities, in aggregate, counts toward the 10-day limit.

e. Landowner may use motorized vehicles to conduct the following low-intensity forest management activities during the spring period:

   i. sale preparation,
   ii. road location,
   iii. tree planting,
   iv. prescribed burning,
   v. data collection (including monitoring),
   vi. non-heavy-equipment slash treatment (chainsaws allowed),
   vii. patrol of fall/winter slash burns,
   viii. noxious weed management.

40. The Landowner will design and implement timber harvest units in a manner that provides effective visual screening for wildlife by utilizing topographic features or by retaining forest vegetation. This shall be done in a manner that ensures that no point within the unit is further than 600 feet from vegetation or topographic breaks that provide effective visual screening.

41. Effective visual screening is defined as a topographic feature, or vegetation patch or strip of sufficient size and density to effectively hide 90% of an animal the size of an adult grizzly bear from view.

42. The Landowner will leave effective visual screening, or a minimum of 100 feet of vegetation that provides visual screening, between open roads, and timber harvest units**.** Retention of vegetation beyond 100 feet of open roads for this purpose may be desirable, but is not required under the terms of this agreement. Commercial harvest of trees out of the visual screening retention area is allowable if screening effectiveness is not compromised. In cases, where maintaining visual screening along open roads is not possible, or breaks in visual screening are necessary to facilitate forest management activities, or protect public safety, landowner may seek a variance to this provision from FWP.

43. The Landowner will retain a minimum of one snag and one live snag recruitment tree of greater than 21 inches diameter at breast height (dbh) per acre in all harvest and salvage units. If snags or snag recruitment trees greater than 21 inches dbh are not present, then the largest snags or snag recruitment trees available will be retained. Retained snags and recruits may be evenly distributed or clumped. Landowner will retain 10 to 15 tons of downed logs greater than 3 inches in diameter within harvest units following harvest or salvage activities. Where available, two non-merchantable logs per acre will be retained that are greater than 15 inches in diameter and 20 feet long. If logs of this size are not available, the largest non-merchantable logs of this type shall be retained.

AQUATIC CONNECTIVITY BMPS

44. Within the Conservation Easement area, the Landowner will provide connectivity for adult and juvenile native fish species during low to bankfull flows by emulating streambed form and function. This will be accomplished using the best available design while considering site conditions and cost efficiencies.
45. On roads the Landowner has access to, and sole ownership of, the Landowner will ensure that all road crossings on stream segments supporting native cold-water fisheries provide connectivity for adult and juvenile fish during low to bank full flows. This will be accomplished for all road crossings on streams supporting bull trout and/or westslope cutthroat trout within the first 15 years of this agreement.

46. The Landowner will prioritize road-stream crossing improvements based on existing levels of connectivity, as well as species status and population goals established while taking into consideration other regulatory agencies' or cooperative organizations' activities and goals. Genetic data used for a coarse filter will be obtained primarily from FWP data sets. Where practicable and where time permits, the Landowner will collaborate with FWP to collect genetic information for target species to supplement those data sets.

47. Fish passage structures in streams will be designed to pass a minimum of the 50-year flood event.

48. Road-stream crossings that provide connectivity to limited or marginal fisheries habitat may not be required to emulate streambed form and function when approved by FWP.

SMZ LAW AND BMP FORESTRY PRACTICES

49. Where forest practices are not specifically addressed in these Standards, the Montana SMZ Law and Rules and Best Management Practices for Forestry in Montana will apply.

Figure 1. North Chamberlain Conservation Easement Baseline Map
Figure 2. North Chamberlain Conservation Easement, Spring Grizzly Bear Habitat Map

Attachment A. Best Management Practices for Forestry in Montana

Figure 1
North Chamberlain Conservation Easement Baseline Map

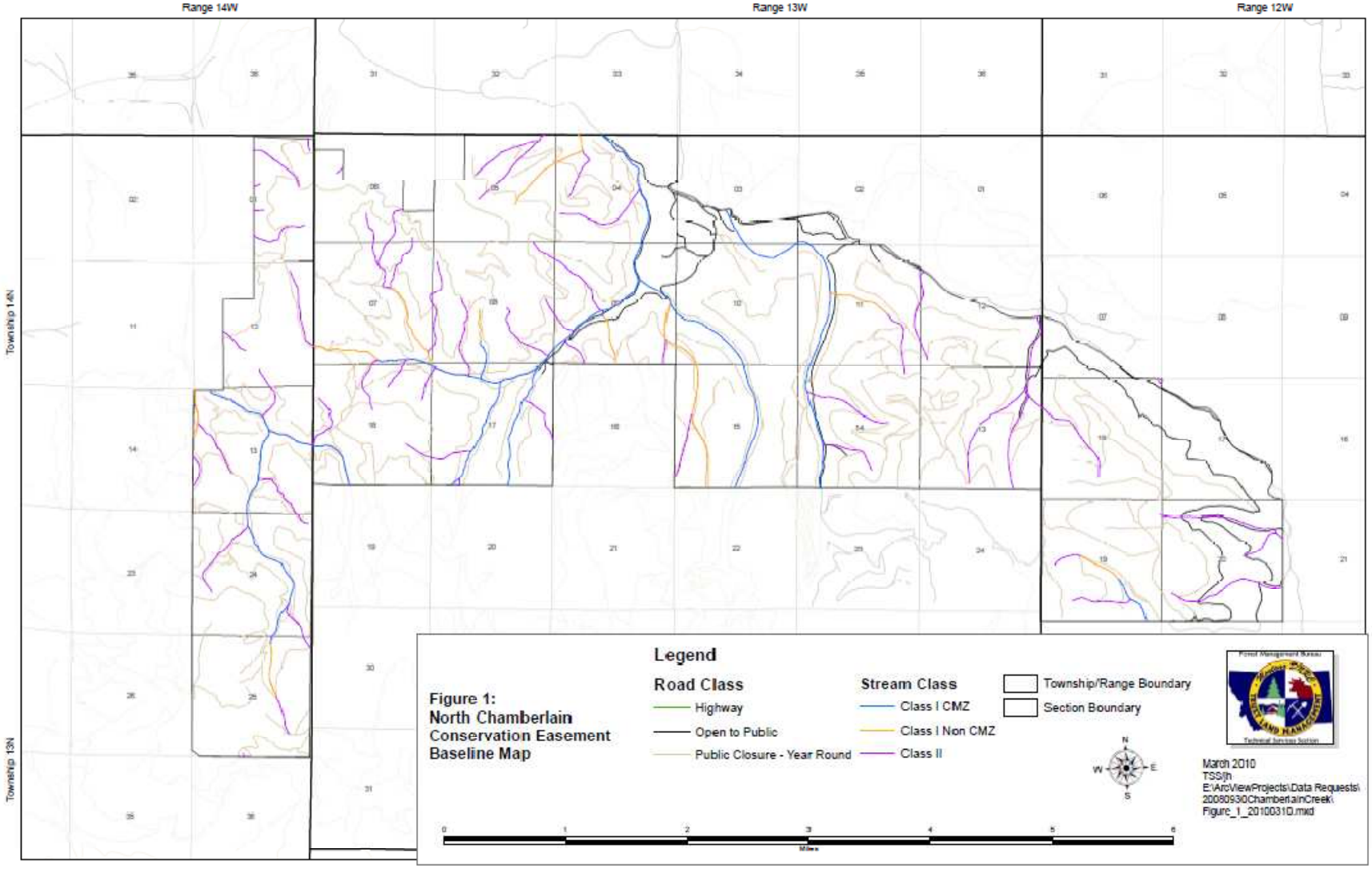
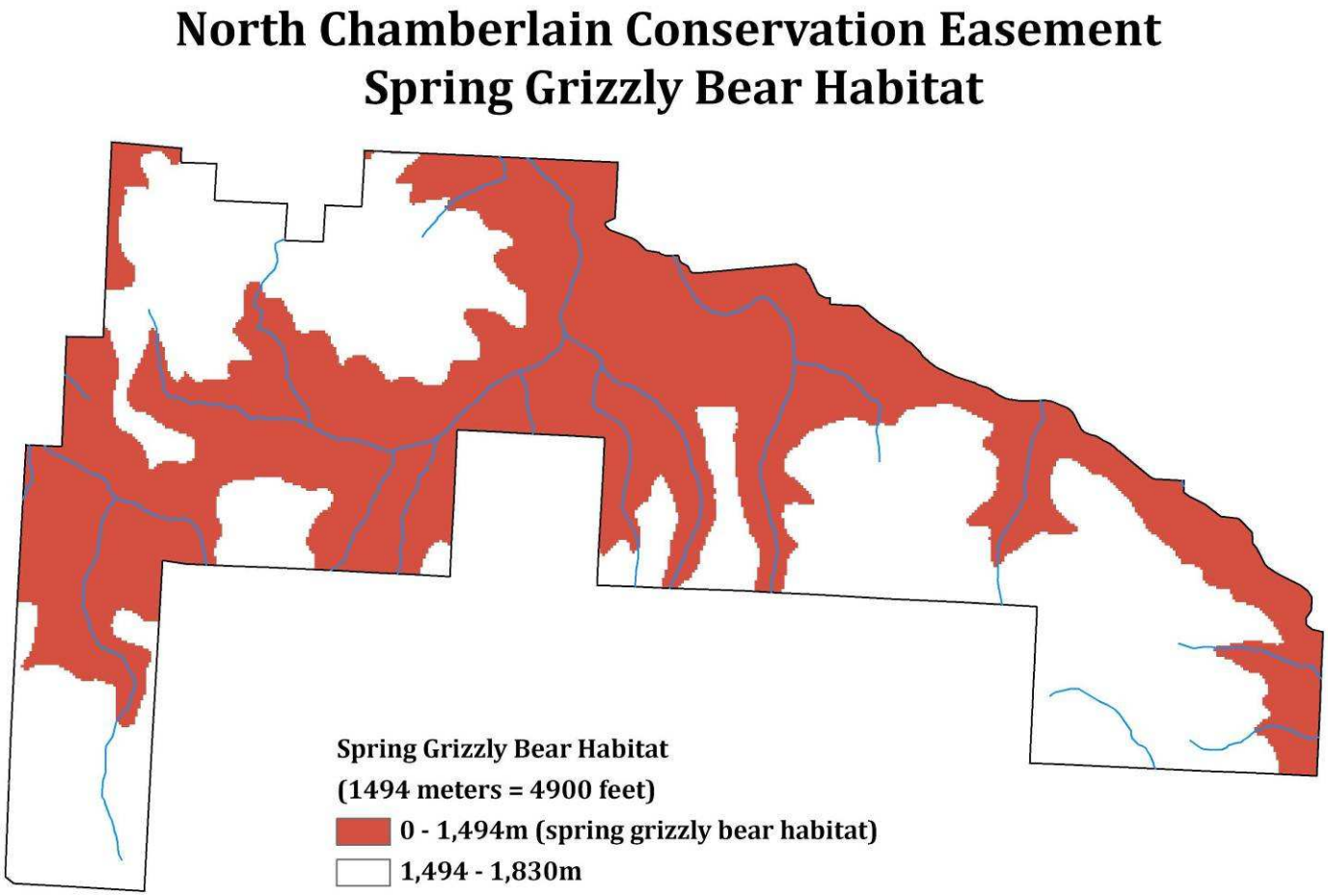


Figure 2


North Chamberlain Conservation Easement
Spring Grizzly Bear Habitat
Spring Grizzly Bear Habitat
(1494 meters = 4900 feet)
0 - 1,494m (spring grizzly bear habitat)
1,494 - 1,830m

Attachment A

BEST MANAGEMENT PRACTICES FOR FORESTRY IN MONTANA

January 2006
* BMPs Not Monitored During Audits

I. DEFINITIONS

1. "Hazardous or toxic material" means substances which by their nature are dangerous to handle or dispose of, or a potential environmental contaminant, and includes petroleum products, pesticides, herbicides, chemicals, and biological wastes.

2. "Stream," as defined in 77-5-302(7), MCA, means a natural water course of perceptible extent that has a generally sandy or rocky bottom or definite banks and that confines and conducts continuously or intermittently flowing water.

3. "Streamside Management Zone (SMZ)" or "zone" as defined at 77-5-302(8), MCA means "the stream, lake, or other body of water and an adjacent area of varying width where management practices that might affect wildlife habitat or water quality, fish, or other aquatic resources need to be modified." The streamside management zone encompasses a strip at least 50 feet wide on each side of a stream, lake, or other body of water, measured from the ordinary high water mark, and extends beyond the high water mark to include wetlands and areas that provide additional protection in zones with steep slopes or erosive soils.

4. "Wetlands" mean those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include marshes, swamps, bogs, and similar areas.

5. Adjacent wetlands are wetlands within or adjoining the SMZ boundary. They are regulated under the SMZ law.

6. Isolated wetlands lie within the area of operation, outside of the SMZ boundary, and are not regulated under the SMZ law.

II. STREAMSIDE MANAGEMENT

The Streamside Management Law (77-5-301 through 307 MCA) provides minimum regulatory standards for forest practices in streamside management zones (SMZ). The "Montana Guide to the Streamside Management Zone & Rules" is an excellent information source describing management opportunities and limitations within SMZs.

III. ROADS

A. Planning and Location

1. Minimize the number of roads constructed in a watershed through comprehensive road planning, recognizing intermingled ownership and foreseeable future uses. Use existing roads, unless use of such roads would cause or aggravate an erosion problem.

2. Review available information and consult with professionals as necessary to help identify erodible soils and unstable areas, and to locate appropriate road surface materials.*

3. Fit the road to the topography by locating roads on natural benches and following natural contours. Avoid long, steep road grades and narrow canyons.

4. Locate roads on stable geology, including well-drained soils and rock formations that tend to dip into the slope. Avoid slumps and slide-prone areas characterized by steep slopes, highly weathered bedrock, clay beds, concave slopes, hummocky topography, and rock layers that dip parallel to the slope. Avoid wet areas, including moisture-laden or unstable toe slopes, seeps, wetlands, wet meadows, and natural drainage channels.

5. Minimize the number of stream crossings and choose stable stream crossing sites.

6. Locate roads to provide access to suitable (relatively flat and well-drained) log landing areas to reduce soil disturbance.*

B. Design

1. Properly design roads and drainage facilities to prevent potential water quality problems from road construction.*

2. Design roads to the minimum standard necessary to accommodate anticipated use and equipment. The need for higher engineering standards can be alleviated through proper road-use management.

3. Design roads to balance cuts and fills or use full bench construction (no fill slope) where stable fill construction is not possible.*

4. Design roads to minimize disruption of natural drainage patterns. Vary road grades to reduce concentrated flow in road drainage ditches, culverts, and on fill slopes and road surfaces.

C. **Road Drainage** Road Drainage is defined as all applied mechanisms for managing water in a non-stream crossing setting, road surface drainage, and overland flow; ditch relief, cross drains and drain dips)

1. Provide adequate drainage from the surface of all permanent and temporary roads. Use outsloped, insloped or crowned roads, and install proper drainage features. Space road drainage features so peak flow on road surfaces or in ditches will not exceed capacity.

    a. Outsloped roads provide a means of dispersing water in a low-energy flow from the road surface. Outsloped roads are appropriate when fill slopes are stable, drainage will not flow directly into stream channels, and transportation safety can be met.

    b. For in-sloped roads, plan ditch gradients steep enough, generally greater than 2% but less than 8%, to prevent sediment deposition and ditch erosion. The steeper gradients may be suitable for more stable soils; use the lower gradients for less stable soils.

    c. Design and install road surface drainage features at adequate spacing to control erosion; steeper gradients require more frequent drainage features. Properly constructed drain dips can be an economical method of road surface drainage. Construct drain dips deep enough into the subgrade so that traffic will not obliterate them.

2. Design all ephemeral draw culverts with adequate length to allow for road fill width. Minimum culvert size is 15 inch. Install culverts to prevent erosion of fill, seepage and failure as described in V.C.4 and maintain cover for culverts as described in V.C.6.

3. Design all relief culverts with adequate length to allow for road fill width. Protect the inflow end of all relief culverts from plugging and armor if in erodible soil. When necessary construct catch basins with stable side slopes. Unless water flows from two directions, skew ditch relief culverts 20 to 30 degrees toward the inflow from the ditch to help maintain proper function.

4. Where possible, install culverts at the gradient of the original ground slope; otherwise, armor outlets with rock or anchor downspouts to carry water safely across the fill slope.

5. Provide energy dissipaters (rock piles, slash, log chunks, etc.) where necessary to reduce erosion at outlet of drainage features. Crossdrains, culverts, water bars, dips, and other drainage structures should not discharge onto erodible soils or fill slopes without outfall protection.

6. Prevent downslope movement of sediment by using sediment catch basins, drop inlets, changes in road grade, headwalls, or recessed cut slopes.*

7. Route road drainage through adequate filtration zones or other sediment-settling structures to ensure sediment doesn't reach surface water. Install road drainage features above stream crossings to route discharge into filtration zones before entering a stream.

D. **Construction** (see also Section IV on stream crossings)

1. Keep slope stabilization, erosion and sediment control work current with road construction. Install drainage features as part of the construction process, ensuring that drainage structures are fully functional. Complete or stabilize road sections within same operating season.*

2. Stabilize erodible, exposed soils by seeding, compacting, riprapping, benching, mulching, or other suitable means.

3. At the toe of potentially erodible fill slopes, particularly near stream channels, pile slash in a row parallel to the road to trap sediment (example, slash filter windrow). When done concurrently with road construction, this is one method that can effectively control sediment movement, and it can also provide an economical way of disposing of roadway slash. Limit the height, width and length of "slash filter windrows" so wildlife movement is not impeded. Sediment fabric fences or other methods may be used if effective.

4. Minimize earthmoving activities when soils appear excessively wet. Do not disturb roadside vegetation more than necessary to maintain slope stability and to serve traffic needs.*

5. Construct cut and fill slopes at stable angles to prevent sloughing and other subsequent erosion.

6. Avoid incorporating potentially unstable woody debris in the fill portion of the road prism. Where possible, leave existing rooted trees or shrubs at the toe of the fill slope to stabilize the fill.

7. Consider road surfacing to minimize erosion.*

8. Place debris, overburden, and other waste materials associated with construction and maintenance activities in a location to avoid entry into streams. Include these waste areas in soil stabilization planning for the road.

9. Minimize sediment production from borrow pits and gravel sources through proper location, development and reclamation.

10. When using existing roads, reconstruct only to the extent necessary to provide adequate drainage and safety; avoid disturbing stable road surfaces. Prior to reconstruction of existing roads within the SMZ, refer to the SMZ law. Consider abandoning existing roads when their use would aggravate erosion.

E. <u>Maintenance</u>

1. Grade road surfaces only as often as necessary to maintain a stable running surface and adequate surface drainage.

2. Maintain erosion control features through periodic inspection and maintenance, including cleaning dips and crossdrains, repairing ditches, marking culvert inlets to aid in location, and clearing debris from culverts.

3. Avoid cutting the toe of cut slopes when grading roads, pulling ditches, or plowing snow.

4. When plowing snow, provide breaks in snow berm to allow road drainage.*

5. Haul all excess material removed by maintenance operations to safe disposal sites and stabilize these sites to prevent erosion. Avoid sidecasting in locations where erosion will carry materials into a stream.*

6. Avoid using roads during wet periods if such use would likely damage the road drainage features. Consider gates, barricades or signs to limit use of roads during spring break up or other wet periods.

7. Upon completion of seasonal operations, ensure that drainage features are fully functional. The road surface should be crowned, outsloped, insloped, or water-barred. Remove berms from the outside edge where runoff is channeled.*

8. Leave abandoned roads in a condition that provides adequate drainage without further maintenance. Close these roads to traffic; reseed and/or scarify; and, if necessary, recontour and provide water bars or drain dips.

IV. TIMBER HARVESTING, AND SITE PREPARATION

A. Harvest Design

1. Plan timber harvest in consideration of your management objectives and the following*:

    a. Soils and erosion hazard identification.
    b. Rainfall.
    c. Topography.
    d. Silvicultural objectives.
    e. Critical components (aspect, water courses, landform, etc.).
    f. Habitat types.
    g. Potential effects on water quality and beneficial water uses.
    h. Watershed condition and cumulative effects of multiple timber management activities on water yield and sediment production.
    i. Wildlife habitat.

2. Use the logging system that best fits the topography, soil type, and season, while minimizing soil disturbance and economically accomplishing silvicultural objectives.

3. Use the economically feasible yarding system that will minimize road densities.*

4. Design and locate skid trails and skidding operations to minimize soil disturbance. Using designated skid trails is one means of limiting site disturbance and soil compaction. Consider the potential for erosion and possible alternative yarding systems prior to planning tractor skidding on steep or unstable slopes.*

5. Locate skid trails to avoid concentrating runoff and provide breaks in grade. Locate skid trails and landings away from natural drainage systems and divert runoff to stable areas. Limit the grade of constructed skid trails on geologically unstable, saturated, highly erosive, or easily compacted soils to a maximum of 30%. Use mitigating measures, such as water bars and grass seeding, to reduce erosion on skid trails.

6. Minimize the size and number of landings to accommodate safe, economical operation. Avoid locating landings that require skidding across drainage bottoms.

B. Other Harvesting Activities

1. Tractor skid where compaction, displacement, and erosion will be minimized. Avoid tractor or wheeled skidding on unstable, wet, or easily compacted soils and on slopes that exceed 40% unless operation can be conducted without causing excessive erosion. Avoid skidding with the blade lowered. Suspend leading ends of logs during skidding whenever possible.

2. Avoid operation of wheeled or tracked equipment within isolated wetlands, except when the ground is frozen (see Section VI on winter logging).

3. Use directional felling or alternative skidding systems for harvest operations in isolated wetlands.*

4. For each landing, provide and maintain a drainage system to control the dispersal of water and to prevent sediment from entering streams.

5. Insure adequate drainage on skid trails to prevent erosion. On gentle slopes with slight disturbance, a light ground cover of slash, mulch or seed may be sufficient. Appropriate spacing between water bars is dependent on the soil type and slope of the skid trails. Timely implementation is important.

6. When existing vegetation is inadequate to prevent accelerated erosion, apply seed or construct water bars before the next growing season on skid trails, landings and fire trails. A light ground cover of slash or mulch will retard erosion.*

C. Slash Treatment and Site Preparation

1. Rapid reforestation of harvested areas is encouraged to reestablish protective vegetation.*

2. When treating slash, care should be taken to preserve the surface soil horizon by using appropriate techniques and equipment. Avoid use of dozers with angle blades.

3. Minimize or eliminate elongated exposure of soils up and down the slope during mechanical scarification.*

4. Scarify the soil only to the extent necessary to meet the resource management objectives. Some slash and small brush should be left to slow surface runoff, return soil nutrients, and provide shade for seedlings.

5. Carry out brush piling and scarification when soils are frozen or dry enough to minimize compaction and displacement.

6. Carry out scarification on steep slopes in a manner that minimizes erosion. Broadcast burning and/or herbicide application is preferred means for site preparation, especially on slopes greater than 40%.

7. Remove all logging machinery debris to proper disposal site.*

8. Limit water quality impacts of prescribed fire by constructing water bars in firelines; not placing slash in drainage features and avoiding intense fires unless needed to meet silvicultural goals. Avoid slash piles in the SMZ when using existing roads for landings.

V. STREAM CROSSINGS

A. Legal Requirements

1. Under the Natural Streambed and Land Preservation Act of 1975 (the "310 law"), any activity that would result in physical alteration or modification of a perennial stream, its bed or immediate banks must be approved in advance by the supervisors of the local conservation district. Permanent or temporary stream crossing structures, fords, riprapping or other bank stabilization measures, and culvert installations on perennial streams are some of the forestry-related projects subject to 310 permits.

   Before beginning such a project, the operator must submit a permit application to the conservation district indicating the location, description, and project plans. The evaluation generally includes on-site review, and the permitting process may take up to 60 days.

2. Stream-crossing projects initiated by federal, state or local agencies are subject to approval under the "124 permit" process (administered by the Department of Fish, Wildlife and Parks), rather than the 310 permit.

3. A short-term exemption (3a authorization) from water quality standards is necessary unless waived by the Department of Fish, Wildlife and Parks as a condition of a 310 or 124 permit. Contact the

Department of Environmental Quality in Helena at 444-2406 for additional information.

B. <u>Design Considerations</u> (Note: 310 permit required for perennial streams)

1. Cross streams at right angles to the main channel if practical. Adjust the road grade to avoid the concentration of road drainage to stream crossings. Direct drainage flows away from the stream crossing site or into an adequate filter.

2. Avoid unimproved stream crossings. Depending on location, culverts, bridges and stable/reinforced fords may be used.

C. <u>Installation of Stream Crossings</u> (Note: 310 permit required for perennial streams)

1. Minimize stream channel disturbances and related sediment problems during construction of road and installation of stream crossing structures. Do not place erodible material into stream channels. Remove stockpiled material from high water zones. Locate temporary construction bypass roads in locations where the stream course will have minimal disturbance. Time construction activities to protect fisheries and water quality.

2. <u>Design stream-crossings for adequate passage of fish (if present) with minimum impact on water quality.</u> When using culverts to cross small streams, install those culverts to conform to the natural stream bed and slope on all perennial streams and on intermittent streams that support fish or that provides seasonal fish passage. <u>Ensure fish movement is not impeded. Place culverts slightly below normal stream grade to avoid outfall barriers.</u>

3. Do not alter stream channels upstream from culverts, unless necessary to protect fill or to prevent culvert blockage. On stream crossings, design for, at a minimum, the 25-year frequency runoff. Consider oversized pipe when debris loading may pose problems. Ensure sizing provides adequate length to allow for depth of road fill.

4. Install stream-crossing culverts to prevent erosion of fill. Compact the fill material to prevent seepage and failure. Armor the inlet and/or outlet with rock or other suitable material where feasible.

5. Consider dewatering stream crossing sites during culvert installation.*

6. Maintain a 1-foot minimum cover for stream-crossing culverts 15 to 36 inches in diameter, and a cover of one-third diameter for larger

culverts, to prevent crushing by traffic.

7. Use culverts with a minimum diameter of 15 inches for permanent stream crossings.*

D. <u>Existing Stream Crossing</u>

1. Ensure stream crossing culverts have adequate length to allow for road fill width and are maintained to preserve their hydrologic capacity. To prevent erosion of fill, provide or maintain armoring at inlet and/or outlet with rock or other suitable material where feasible. Maintain fill over culvert as described in V.C. 6.

VI. Winter Logging

A. <u>General</u>

1. Consider snow-road construction and winter harvesting in isolated wetlands and other areas with high water tables or soil erosion and compaction hazards.*

2. Conduct winter logging operations when the ground is frozen or snow cover is adequate (generally more than one foot) to prevent rutting or displacement of soil. Be prepared to suspend operations if conditions change rapidly, and when the erosion hazard becomes high.*

3. Consult with operators experienced in winter logging techniques.*

B. <u>Road Construction and Harvesting Considerations</u>

1. For road systems across areas of poor bearing capacity, consider hauling only during frozen periods. During cold weather, plow any snow cover off of the roadway to facilitate deep freezing of the road grade prior to hauling.*

2. Before logging, mark existing culvert locations. During and after logging, make sure that all culverts and ditches are open and functional.*

3. Use compacted snow for road beds in unroaded, wet or sensitive sites. Construct snow roads for single-entry harvests or for temporary roads.*

4. In wet, unfrozen soil areas, use tractors or skidders to compact the snow for skid road locations only when adequate snow depth exists.

Avoid steeper areas where frozen skid trails may be subject to erosion the next spring.*

5. Return the following summer and build erosion barriers on any trails that are steep enough to erode.*

VII. HAZARDOUS SUBSTANCES

A. General

1. Know and comply with regulations governing the storage, handling, application (including licensing of applicators), and disposal of hazardous substances. Follow all label instructions.

2. Develop a contingency plan for hazardous substance spills, including cleanup procedures and notification of the State Department of Environmental Quality.*

B. Pesticides and Herbicides

1. Use an integrated approach to weed and pest control, including manual, biological, mechanical, preventive and chemical means.*

2. To enhance effectiveness and prevent transport into streams, apply chemicals during appropriate weather conditions (generally calm and dry) and during the optimum time for control of the target pest or weed.*