3.5 Other Considerations

3.5.1 Soils

The public expressed concern about impacts of proposed activities on soils and wetlands. Comments were received concerning soil nutrients, soil erosion, and the need to mitigate impacts to forest soils and wetlands.

With our decision to implement the Selected Alternative, soil quality, nutrient status, and wetlands will be adequately protected because mitigation measures provide direction for protecting soils and wetlands from the effects of activities. Design features and mitigation measures will also provide protection for sensitive ELTs (ecological landtypes) where treatments can influence the nutrient status of soils. Through implementation of the Forest Plan standards and guidelines, Forest Management Guidelines and design features and mitigation measures (ROD Attachment 9) in this document, the effects of the activities in the Selected Alternative on soil and wetland quality will be minimal.

The soils and wetlands in the Project Area range from shallow soils over bedrock to deep organic wetland soils. The dominant upland ELTs in the Project Area are the shallow to bedrock types which make up roughly half of the area. The dominant lowland is deep organic type. The ELTs in each treatment unit have been identified for the Project.

Soil compaction can disrupt water and air movement into and through the soil. This results in poor soil aeration, which negatively affects root growth and activity of soil organisms involved in nutrient cycling. ELTs sensitive to compaction are grouped into compaction classes. The compaction classes do not include most of the well-drained upland ELTs because they are less susceptible to compaction due to soil texture and hydrology. Table 3.12-2 in the Final EIS shows acres of each compaction class for the Selected Alternative. All acreage in Compaction Class 1 (which includes wetter sites) will be either excluded from the treatment boundary during layout of the unit or operations will occur in winter when the ground is frozen to avoid detrimental impacts. Operations will occur either during the normal dry period or on frozen ground to avoid detrimental impacts to acreage in Compaction Class 2 (which includes soil properties that range from seasonally moist to well-drained with temporarily saturated soils dependant on weather conditions).

Soil disturbance can occur from the construction of landings associated with timber harvest and the use of skid trails in the unit. The actual number of landings to be built and skid trails used in a unit depends on a number of factors, including site topography. The final number and location of landings and skid trails will be determined cooperatively between the logging contractor and the Forest Service timber sale administrator prior to harvesting the unit.

Based on monitoring data on the Superior National Forest, acres of landings and skid trails in treatment units where landings utilize 1% of harvest area, and skid trails utilize 4.3% of harvest area, Soils Table - 3.12-3 in the Final EIS shows the approximate acreage in the Selected Alternative that will be impacted by landings and skid trails by the various treatments.

Nutrient loss in soil is associated with vegetation removal and with the loss of the forest floor (surface organic layer). Soil organic matter and logging slash provide a barrier to the loss of soil moisture by acting as mulch, improving soil drainage and aeration. Low productivity ELTs are generally shallow to bedrock (soils less than 40 inches deep) or characterized by deep sandy material. Nutrient storage in shallow soils is limited by the lack of soil to provide the storage. Sandy soils do not have the texture or amount of organic matter to hold nutrients. Table ROD-10 shows acres of treatment on ELTs sensitive to nutrient loss.

Table ROD-10. Acres of Treatment on Sensitive Soils ELTs[1, 2]

	No Action	Selected Alternative	Alt. 2	Alt. 4
Acres of Treatment	0	9,990	11,860	9,680

[1] Sensitive ELTs include 7, 8, 9, 11, 16, 17, and 18

[2] Note that not all ELT 18 acres included in this total acreage will be treated.

In our decision, there are a number of treatment units that include mapped ELT 18. This ELT commonly occurs with ELT 16 and ELT 17. This ELT supports plant communities that have adapted to very droughty conditions. These ELTs vary in the depth of loamy and sandy loam soil to bedrock with ELT 18 having the shallowest soil depth. ELT 18 productivity can vary due to soil depth and possibly bedrock composition. Well-drained ELT 18s support red, white, and jack pine along with some smaller red maple, paper birch, and oak. Jack pine can be widespread and mosses commonly cover the ground.

In the Echo Trail Area Project, some ELT 18s are park-like with scattered pine and a great deal of exposed bedrock with a moss and lichen cover. (See ROD Figures 30 and 31 for photographic examples of ELT 18.) Other ELT 18s in the area have a thicker organic layer over mineral soil and support a canopy of jack, red and/or white pine similar to an ELT 17.

Figure ROD-30. *Example of ELT 18 site.*

Figure ROD-31. *Example of ELT 18 site.*

In the Selected Alternative, some of the ELT 18s that are verified to be more productive than the ELT 18 "model" are included for treatment activities. These verified sites will be monitored prior to and after harvest to insure adequate reforestation and sustain the 20 cubic feet/acre/year growth capability. The ELT 18s that are scheduled for treatment will be field-checked and verified suitable for harvest using the following process (personal communication with Barbara Leuelling, Forest Soil Scientist, 2005b):

- At least 3 site index (SI) measurements (per dominant tree species) will be taken within the mapped ELT 18 to document that productivity is higher than site index 35. Site index is a measure based upon height of the dominant trees in a stand at a chosen age. SI is used with growth and yield tables. It indicates that the quality of the site has the ability to adequately reforest within five years. A higher SI indicates higher site productivity for any one species of tree.

- ELT 18 sites with a SI greater than 35 (able to sustain 20 cubic feet/acre/year and reforestation can be reasonably predicted to occur on them) will be scheduled for treatment.

- These units scheduled for treatment will then be treated as an ELT 17, assign winter operation only, and maintain nutrients on the site according to Table G-WS-8a (Forest Plan, p. 2-7, E—retain/return distributed slash or woody debris and, where appropriate, retain stumps and bark on site. F—Determine long term strategy on these ELTs for soil nutrient and tree nutrient efficiency. Favor maintaining or converting to pine/conifer type within LE vegetation composition by type objectives, and favor vegetation objectives for older growth stages. If existing stand is aspen/birch, favor partial cut & under plant to convert, or leaving more residual basal area when converting.)

- Where equipment operability on these sites is a concern because slope or bedrock configuration may make it infeasible to treat the stand or portions of the stand, portions of the stand will be excluded from harvest activity.

As noted, mitigation measures include the above criteria as well as routine monitoring for reforestation within the 5 year period. All other mapped ELT 18s in the Project Area will be excluded from harvest. The Final EIS Soils Table 3.12-5 shows the acres of mapped ELT 18 in the Selected Alternative. Not all of these ELT 18 acres will have treatment. Some ELT 18s will be taken out of the treatment unit. ELT 18s that meet the criteria for harvest will be documented.

The amount of soil displacement associated with road construction and temporary roads varies by season of operation. Management activities will include constructing OML 1 roads, special use road access and the use of temporary roads to access treatment units. Use of roads will either avoid wetlands in road construction or use will occur in winter when the ground is frozen to avoid detrimental impacts. Roads will be constructed with design techniques that avoid changes in hydrology and minimize rutting and/or compaction. Temporary roads are decommissioned after use and not a part of the transportation system.

ROD Table 1 shows the miles of road that will be decommissioned that are currently in use and need work to close. Some of the roads that require closure are old winter roads crossing wetlands. Roads to be decommissioned will be accomplished with a variety of techniques depending on the particular road. This could include improving the construction of berms which close roads by rebuilding or re-vegetating, obliterating segments of road that are still drivable, buffering wetlands, stabilizing slopes, removing culverts from wetlands and stream crossings and planting trees. Decommissioning will prevent use of the road and protect the soil and wetland resource.

In summary, with our decision to implement the Selected Alternative, soil quality, nutrient status, and wetlands will be adequately protected. Mitigation measures provide direction for protecting soils and wetlands and for sensitive ELTs where treatments can influence the nutrient status of soils. Through implementation of design features and mitigation measures (Attachment 9) and Forest Plan standards and guidelines, implementing the Selected Alternative will not decrease soil and wetland productivity.

3.5.2 Economics / Forest Products

The National Forests provide direct and indirect multiple economic benefits to Minnesota and surrounding states, and especially to individuals and communities within the northern region. Economic benefits contributed to the region by the National Forest System land include market and non-market opportunities such as timber volume, tourism, wilderness use, balsam boughs, sightseeing, and fishing.

Forest Plan decisions contribute to economic sustainability by providing for a range of uses, values, products, and services. The benefit cost ratio compares estimated direct expenditures with estimated financial revenues (collected from the sale of forest products). This helps us determine whether the proposed activities represent a prudent means of achieving the resource objectives outlined in the Forest Plan.

The benefit/cost ratio is very similar for all the action alternatives. The Final EIS Chapter 3.17 provides economic data with analysis for all alternatives. The Selected Alternative results in a benefit cost ratio of 0.75. Costs of the Project include environmental analysis preparation, timber sale layout, administration, regeneration and planting activities, and road closures. The benefit cost ratio is below 1.0 due to the high

costs of reforestation activities in the alternative. We find that when all is considered in the context of complete forest management, including timber harvest, planting, timber stand improvement, the project will cost more than the income generating activities which include timber sales.

The Superior National Forest has provided timber to the local economy for many years and by continuing to provide timber, we help ensure stable community economics. This project helps maintain a sustainable supply of raw materials, including providing wood products to the timber industry that is very important to northern Minnesota. The sale of timber also benefits the local counties and schools through the Payment in Lieu of Taxes Fund. This project may generate up to $1,418,722 for the 25 Percent Fund.

Any of the action alternatives would capture a large portion of raw material that otherwise would soon be lost for human uses. As the trees age, they start to decay and are not usable for human needs. Our society uses wood products for many things and we can utilize the trees before they become unmerchantable.

The Selected Alternative will produce approximately 58 million board feet of timber. This amount will provide for sustainable products in an environmentally acceptable manner. This area has provided commercial timber in the past, and the lands proposed for harvest have been identified as being suitable for timber harvest. The Forest Plan does allocate land for sustainable wood production.

3.5.3 Watershed Health

The project will directly benefit water quality and watershed health within the Project Area through road decommissioning and stream crossing removals.

The Selected Alternative will decommission roads and will result in fewer permanent stream crossings (see ROD Table 1). This will lessen the adverse impacts on water quality that may have been occurring due to these roads and stream crossings. There are multiple beneficial resource effects of decommissioning roads. Decommissioning roads reduces: total road surface area; potential surface erosion and run-off; and, sediment input into local streams, lakes, and wetlands. The beneficial effects of removing stream crossings include: a reduction in point source erosion and sediment input at existing stream crossing sites and an improvement of natural stream flow conditions, flood flow capacity, and floodplain function as well as sediment and large woody debris transport. Benefits to aquatic organisms include improved egg and juvenile survival, aquatic organism passage, and stream connectivity.

Riparian and wetland design features and mitigation measures (ROD Attachment 9) will adequately protect the watershed health and the quality of the fisheries resource in the Project Area.

3.5.4 Air Quality

The Echo Trail Project Area does not propose any broadcast burning or underburning in the three action alternatives. However, the Selected Alternative will reduce or burn piles of logging slash (Final EIS Chapter 2.3 and 3.14).

The effect of the smoke from burning piles would be negligible to people downwind. Using the standard Forest Service and EPA modeling tools and worst case assumptions, smoke coming from burning piles was modeled and shown to have the potential to exceed health standards for only the first 2.8 miles downwind. This is less than the distance assumed to the closest possible sensitive receptor (4 miles). (Final EIS Section 3.14.6.1)