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Tamarack Quarry Expansion Project

Final Environmental Impact Statement

Mt. Hood National Forest

Final
Environmental Impact Statement
for the

Tamarack Quarry Expansion Project
Mt. Hood National Forest

US Department of Agriculture, Forest Service
Mt. Hood National Forest

January 2006

Acronyms and Abbreviations

ACDP	Air Contaminant Discharge Permit
ACS	Aquatic Conservation Strategy
ADT	average daily traffic
AINW	Archaeological Investigations Northwest, Inc.
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CSC	closed small conifer (structure classification)
dbh	diameter at breast height
DEIS	Draft Environmental Impact Statement
DEM	digital elevation model
DEQ	Oregon Department of Environmental Quality
DLC	Donation Land Claim
DOGAMI	Oregon Department of Geology and Mineral Industries
EIS	Environmental Impact Statement
EO	Executive Order
EPA	US Environmental Protection Agency
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FEMAT	Forest Ecosystem Management Assessment Team
FS	USDA Forest Service
GFS	grass/forb/shrub (structure classification)
GIS	geographic information system
GLO	General Land Office
LCDC	Oregon Land Conservation and Development Commission
LRMP	Land and Resource Management Plan
MP	mile post
NEPA	National Environmental Policy Act
NRF	nesting, roosting, and foraging (habitat)
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OR	Oregon Route
ROD	Record of Decision
RV	recreational vehicle
SHPO	State Historic Preservation Officer
TES	Threatened, Endangered, and Sensitive

US	United States
USC	United States Code
USDA	US Department of Agriculture
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
VQO	Visual Quality Objective

Tamarack Quarry Expansion Project
Final Environmental Impact Statement

Mt. Hood National Forest
Clackamas County, Oregon

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Abstract: This Final Environmental Impact Statement (FEIS) documents the analysis of three alternatives, including the No Action Alternative, developed for the Tamarack Quarry Expansion Project. The purpose of the proposed action is to secure a long-term, economical source of rock material for the USDA Forest Service (FS) and Oregon Department of Transportation (ODOT) to use on highways and forest roads near Mt. Hood.

Rock would be excavated first from the remaining seven acres in the currently permitted area, then from the expansion area. Excavation would occur over the next 20 or more years, as rock is needed. ODOT anticipates removing 40,000 to 90,000 cubic yards of rock per year. The FS would extract 10,000 to 15,000 cubic yards of rock per year for project work other than emergencies. The excavated material would be used by ODOT and the FS for road maintenance and construction, including improvements to US Highway 26 and Oregon Route 35. Activities under all alternatives would include blasting, rock crushing, screening, batching, loading and hauling, importing excess materials for reprocessing or quarry reclamation, and short-term stockpiling of excavated rock and soils. Portions of the quarry may be reclaimed in stages and a copy of this plan is included in this FEIS in Appendix G. No improvements would be made to the haul route (FS roads 2656 and 2656-955) except for routine maintenance.

Alternative 1 would expand the Tamarack Quarry by approximately 41 acres more than the currently permitted 29 acres, for a total area of approximately 70 acres. With Alternative 2, the Tamarack Quarry would be expanded by approximately 21 acres, for a total area of approximately 50 acres. With the No Action Alternative the quarry would not be expanded beyond the permitted area.

Reviewers provided the FS with their comments during the review period of the DEIS. These comments along with the FS responses are included in this FEIS in Appendix F. A copy of the FEIS is available online at http://www.fs.fed.us/r6/mthood under Projects & Plans.

Summary

The proposed action is to expand the existing Tamarack Quarry (formerly known as the Mud Creek Quarry) to encompass approximately 70 acres of National Forest system land. Rock would be excavated from the existing quarry and expansion area. The Oregon Department of Transportation (ODOT) and the USDA Forest Service (FS) would use the excavated material for road sanding, road maintenance, and construction including improvements to US Highway 26 (US 26) and Oregon Route 35 (OR 35).

The project area is located in the Mt. Hood National Forest approximately four miles south of Government Camp and US 26, in Section 2, Township 4 South, Range 8½ East, Willamette Meridian, Clackamas County, Oregon. The Tamarack Quarry is approximately 1.5 miles south of Trillium Lake. The project area encompasses approximately 49 acres adjacent to (generally north and east of) the existing Tamarack Quarry. The existing quarry occupies approximately 22 acres; under an existing permit, it can encompass a total of 29 acres. The project area also includes a corridor, approximately 3.1 miles long, along the existing haul route to the quarry from US 26. The haul route is along FS roads 2656 and 2656-955. No improvements are proposed to the haul route except for routine maintenance, which may include resurfacing, structural repairs, striping, placement of safety reflectors, and placement of additional traffic signs. No culvert replacement, road widening, pullout or turn-around construction is proposed.

The purpose of the proposed action is to secure a long-term, economical source of rock material for the FS and ODOT to use for highway and road maintenance (including road sanding), construction, and emergency repairs, as well as for road closures and stream and other site restoration projects in the Mt. Hood area. The proposed action is needed because the ODOT and FS demand over the next 20 years (more than two million cubic yards of rock) is projected to exceed the supply from other existing sources. In order for ODOT to provide a safe and cost-efficient highway system near Mt. Hood (US 26 and OR 35), a secure, long-term source of material nearby is essential. The need for sanding material has also become critical because the previous primary source of material (White River) is no longer available.

Through analysis, ODOT and the FS have determined that the site of the Tamarack Quarry is preferred over other quarry sites in the vicinity of Mt. Hood. Tamarack Quarry has the potential to be a relatively large quarry. It has been excavated and managed in a manner that facilitates continued excavation, and it has reserves of quality source rock. The quarry has a relatively short haul route (approximately 3.1 miles) to US 26. However, the size of the existing quarry is inadequate to provide the amount of rock material needed over the next 20 years. Therefore, the quarry needs to be expanded. Commercial sources are generally more expensive.

Alternative 1 would expand the Tamarack Quarry by approximately 41 acres (to the north and east of the existing quarry) more than what is currently permitted, for a total area of approximately 70 acres. It was developed with the objective of maximizing the amount of material that could be obtained from the quarry while still complying with applicable regulations

and Mt. Hood National Forest Land and Resource Management Plan (LRMP) standards and guidelines.

With Alternative 2, the Tamarack Quarry would be expanded by approximately 21 acres over the currently permitted 29 acres, for a total area of approximately 50 acres. Alternative 2 modifies Alternative 1 to address key issues raised through scoping while still providing enough rock to provide a long-term source. The amount of material removed and duration of use would be less under Alternative 2 than under Alternative 1.

Under the No Action alternative the existing permit would remain in place, and the quarry would not be expanded beyond the current permit boundaries. Under the No Action Alternative the FS would be the primary user of the quarry and ODOT would use the quarry in emergency situations. The FS estimates the existing quarry would yield approximately 750,000 cubic yards of material.

ODOT and the FS also considered other quarry sites in the Mt. Hood area to provide an economical long-term rock material source near US 26 and OR 35. Of the five other quarries, four are small and do not contain an adequate quantity of material (Laurel Hill, Skyline, Kiyi, and Jackey). The one quarry that is large enough (Shell Rock) was eliminated because of the poor quality of material and the environmental constraints of visual impacts along Road 17 and the municipal watershed.

With both Action Alternatives, rock would be excavated first from the remaining seven acres in the currently permitted area, then in the expansion area. Expansion would not occur all at once. It would occur in stages, as additional rock resources are needed. All existing vegetation would eventually be removed within the expansion area, and the area would be revegetated per the reclamation plan. A reclamation plan has been developed by the FS and ODOT, and would be implemented and updated as expansion occurs. Overburden soil has been and would continue to be saved for use during later reclamation of the quarry.

The amount of material ODOT would remove each year could range from fewer than 40,000 cubic yards to more than 90,000 cubic yards. The FS would extract 10,000 to 15,000 cubic yards of rock per year for project work other than emergencies. According to preliminary estimates by the FS, the total expanded quarry area with Alternative 1 would contain in excess of two million cubic yards of material. Based on extracting approximately 100,000 cubic yards per year, ODOT and the FS would use the quarry for 20 years or more.

Activities would include clearing vegetation, blasting, rock crushing, screening, batching, loading and hauling, importing excess materials (e.g., soils for reclamation and rock from off-site), and some short-term stockpiling of excavated rock and soils. Activities would be subject to timing restrictions to minimize conflicts with recreation and wildlife. No noise-generating or hauling activities would occur on weekends, federal holidays, or any time between the first measurable snowfall and mid-April, except for emergencies. ODOT would be responsible for plowing two

lanes with turnouts on the haul route, as needed, as early as the second full week of April. Typically the FS opens the road a week or two prior to Memorial Day weekend.

No improvements would be made to the haul route except for routine maintenance, which may include resurfacing, structural repairs, striping, placement of safety reflectors, and placement of additional traffic signs. ODOT would pay for a commensurate portion of haul route maintenance.

The project area is within the Mt. Hood National Forest and is subject to the forest-wide standards and guidelines of the LRMP and the Northwest Forest Plan. This final Environmental Impact Statement (DEIS) is tiered to the EIS's that were prepared for the LRMP and the Northwest Forest Plan. The project area is located on the land management designation "Matrix," which allows for activities such as timber harvest and mineral exploration and is subject to the standards and guidelines of the Northwest Forest Plan.

Notices of the proposed action and DEIS were published in the Federal Register (January 15 and May 2, 2002). The project was also listed in the Mt. Hood National Forest's quarterly publication that announces proposed actions in Fall 2002 thru Summer 2005. This quarterly announcement is mailed to approximately 300 groups and individuals and is also available online. Notice of the proposed action was also posted on the Mt. Hood National Forest website: (www.fs.fed.us/r6/mthood). No comments were received following the notices. The project was presented at a public open house on December 5, 2002, at the Mt. Hood National Forest Headquarters in Sandy, Oregon. Several people provided verbal comments at the open house, and the FS received one written comment. An open house with this and other projects was also held on May 13, 2004, at the Lions Club in Welches, Oregon. No comments on this project were received from the public. The DEIS was distributed for public review in July 2004. Four letters were received and are included along with responses in this FEIS.

The following were identified as key issues:

- Scenic Resources: What are the potential project effects on views from key viewpoints on the Mt. Hood National Forest?
- Transportation/Access: What is the potential for increased traffic conflicts between commercial vehicles (i.e., trucks hauling rock) and recreation use (e.g., vehicles entering/leaving Trillium Lake Campground)?
- Recreation: What effects would the project have on cross-country ski trails in the vicinity of the quarry?
- Threatened and Endangered Species: Would the project result in adverse effects to any species listed or proposed for listing under the Endangered Species Act?

Analysis of the key issues and resources determined that the project would meet visual quality objectives as seen from key viewpoints such as Timberline Lodge. ODOT and the FS would limit activities on weekends and holidays and use flaggers and signs to avoid conflicts between heavy truck traffic and recreational users and vehicles. The expansion area would impact a cross-

country trail on the eastern edge of the existing quarry; the trail would be relocated as part of the project. The Action Alternatives would have a "may affect but not likely to adversely affect" determination for the northern spotted owl due to removal of dispersal habitat and disturbance from blasting. Nesting, roosting and foraging habitat for the northern spotted owl would not be removed. No other listed plant, wildlife, or fish species would be affected by the project. Existing soils and hydrology would be altered by the expansion. The project area is not within any riparian reserves, and an erosion control plan is expected to control sediments generated by quarry activities. Vegetation would be altered, as up to 48 acres of early and mid-seral stage forest would be removed over a 20-or-more-year period. The entire quarry would be revegetated in stages. There are no historic or pre-historic resources within the project area.

Long-term, cumulative effects are those that result from the incremental impact of the federal action when added to other past, present, and reasonably foreseeable future federal, state, or private activities that would occur within the action area. Cumulatively, the expansion of the quarry would result in a long-term commitment of resources since it would remove large quantities of rock and create long-term soil and vegetation impacts on up to 70 acres. Although reclamation of the site is planned, the site productivity of the area would be significantly reduced for the long term. Future and foreseeable actions that are scheduled to occur in the Salmon River Watershed other than the proposed action include the Salmonberry #5 commercial thinning timber sale, the Timberline Express Ski Lift at the Timberline Ski Area, the Government Camp fuels reduction project, and trail development in accordance with the Government Camp Trails Master Plan for the Mt Hood area. None of these projects are in the immediate vicinity of the quarry. No other new quarry operations are proposed in the Mt. Hood National Forest. Past activities include previous timber clear-cuts, fire, road construction, and recreation development. Minor cumulative detrimental impacts to soils, wildlife habitat, transportation systems, recreation, and scenic resources, and negligible impacts to the watershed are expected.

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Chapter 1
Purpose of and Need for Action

Changes between Draft and Final EIS:

(Minor corrections, clarifications, and edits are not included in this list.)

- Added information regarding project need.
- Updated public involvement section.
- Updated direction concerning survey and manage species

1 PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION

This final environmental impact statement (FEIS) was prepared in accordance with the National Environmental Policy Act (NEPA), as amended; NEPA regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508); the US Department of Agriculture (USDA) Forest Service (FS) guidelines for implementing NEPA that are included in the Forest Service Manual Chapter 1950 and Forest Service Handbook 1909.15; the Notice, Comment and Appeal Procedures for National Forest System Projects and Activities (36 CFR Part 215); and other related statutes and orders. The goal of the document is to compare the alternatives developed for the Tamarack Quarry in Chapter 2, to disclose the potential environmental effects associated with each alternative, and to allow the Forest Supervisor to make an informed decision regarding future management of the Tamarack Quarry.

The FS is the lead agency and has primary responsibility for preparing this FEIS. The Oregon Department of Transportation (ODOT) and other responsible agencies have also participated in the identification of issues and alternatives for the DEIS.

The proposed action is to expand the Tamarack Quarry as described in Section 1.4. Alternatives for the proposed action are described in Chapter 2.

1.2 PROJECT AREA LOCATION AND DESCRIPTION

The project area is approximately four miles south of Government Camp and US Highway 26 (US 26), in Section 2, Township 4 South, Range 8½ East, Willamette Meridian, Clackamas County, Oregon, on the Mt. Hood National Forest. The Tamarack Quarry is approximately 1.5 miles south of Trillium Lake. Figure 1 shows the project area and location. The haul route for the quarry is along FS roads 2656 and 2656-955.

The project area encompasses approximately 48 acres adjacent to (generally north and east of) the existing Tamarack Quarry. The existing quarry occupies approximately 22 acres, although it is currently permitted to expand to 29 acres (Oregon Department of Geology and Mineral Industries [DOGAMI] Permit Number 03-0092).

Two perennial streams are near the project area. The first is Mud Creek, the only named stream near the project site, which issues from Trillium Lake. The other is an unnamed stream originating from Summit Meadows. Both are headwater tributaries to the Salmon River. The entire length of the Salmon River, from its headwaters to its confluence with the Sandy River, is designated a Wild and Scenic River. The Sandy River is designated Wild and Scenic from its headwaters to the Mt. Hood National Forest boundary.[1]

[1] In 1968, Congress enacted the Wild and Scenic Rivers Act to preserve the free-flowing conditions of and protect the immediate environment of selected rivers that possess outstandingly remarkable scenic, recreational, fish and wildlife, or other values.

1.3 BACKGROUND

Tamarack Quarry lies on the south side of an east-west oriented spur ridge that projects westward from the much larger north-south oriented Mud Creek Ridge. These ridges form the east valley wall of Mud Creek Valley. Both Mud Creek Ridge and the spur ridge are composed of andesite. This material originated as lava flows from ancient volcanoes that predate the present Mt. Hood volcano. The andesite material is approximately one to two million years old.

The first recorded use of this quarry was in 1957, when 40,000 cubic yards were removed for a project on US 26. Early excavations occurred at what is now the lower quarry level. A bench or upper level was started in the 1970s, and, since then, most of the rock excavation has occurred at the upper level. Although the rock usage records for the Tamarack Quarry are incomplete, the estimated volume of rock removed in 46 years of operation is approximately 450,000 cubic yards. The long-term average annual volume of rock removed is therefore about 10,000 cubic yards. Most of the rock removed from this quarry has been used by the FS or ODOT for road projects. Standard rock quality tests have been conducted periodically since 1957, including surface samples and drill core samples. Rock quality test results indicate consistently good quality rock. Rock from Tamarack Quarry has been used satisfactorily for crushed aggregate, highway sand, riprap, and paving rock.

1.4 PROPOSED ACTION

The proposed action is to expand the existing Tamarack Quarry (formerly known as the Mud Creek Quarry) to encompass up to 70 acres of National Forest System land. Rock would be excavated from the existing quarry and the expansion area. The excavated material would be used by ODOT and the FS for road maintenance and construction, including improvements to US 26 and Oregon Route (OR) 35. Other uses may include road closures and site restoration, such as stream projects.

Vegetation removal and rock excavation would occur over the next 20 years, as rock is needed. ODOT anticipates removing 40,000 to 90,000 cubic yards of rock per year, although needs would vary with annual road and weather conditions. The FS would extract 10,000 to 15,000 cubic yards of rock per year for project work other than emergencies. ODOT and the FS would extract rock from the remaining seven acres within the current permitted area prior to entering the expansion area. All existing vegetation in the expansion area would be removed for quarry operations.

Activities would include clearing vegetation, blasting, rock crushing, screening, batching, loading and hauling, importing excess materials (such as from slides and ditch cleanings) for reprocessing or quarry reclamation, and short-term stockpiling of excavated rock and soils. Materials would be stockpiled on-site either for reprocessing or for use in reclamation. Rock for sanding roads would be hauled out of the quarry and stockpiled at various locations: the junction of US 26 and OR 35, the Government Camp maintenance station, Bennett Pass, Parkdale, and the junction of OR 216 and US 26. Construction rock would be quarried as needed and used shortly after crushing.

See Figure 1

Activities would be subject to timing restrictions, as described in Section 2.2. Blasting would be allowed after July 15 only. No noise-generating or hauling activities would occur at night, on weekends, during holidays, or any time between the first measurable snowfall and mid-April, except for emergencies. ODOT would be responsible for plowing two lanes with turnouts on the haul route, as needed, as early as the second full week of April. Typically the FS opens the road a week or two prior to Memorial Day weekend.

The haul route from its junction with US 26 to the quarry is approximately 3.1 miles long, entirely on National Forest System lands, and includes FS roads 2656 and 2656-955. FS road 2656 is surfaced with asphalt. FS spur road 955 is gravel surfaced. No improvements would be made to the haul route except for routine maintenance, which may include resurfacing, structural repairs, striping, placement of safety reflectors, and placement of additional traffic signs. ODOT would pay for a commensurate portion of haul route maintenance. Traffic control, which may include flaggers and signs, would be implemented during hauling. Typical hauling trucks have a 20-cubic-yard capacity. No culvert replacements, road widening, pull-out or turn-around construction would occur as part of the proposed action.

A FS geologist estimated the remaining volume of good quality rock to be at least two million cubic yards. The geologist estimated the volume of the remaining in-place rock based on the topographic information from a 1"=100' site map, the location of surface outcrops, limited drill hole information, an assumption that good quality rock extends north beyond the drill hole locations for about 250 feet, and allowing for 20 percent of the volume to be soil and poor quality rock. The basic assumption is that the spur ridge landform is mostly underlain by the same andesite rock unit. Due to the extensive rock outcrops on the south side of the spur ridge there was little need for subsurface exploration until plans developed to excavate an upper bench. The FS drilled three exploratory holes in 1978. These drill holes are located approximately 150 feet northeast of the present quarry development limit. The drill holes were approximately 120 to 200 feet deep and indicated there is 180 feet or more of good quality rock below about 6 to 20 feet of soil. Additional drilling would be completed to verify the presence of good quality rock before expansion.

A reclamation plan has been developed by the FS and ODOT, and would be implemented and updated as expansion occurs (Appendix G). A reclamation plan is a required condition of any approved plan of operations. The reclamation plan provides details about how ODOT expects to accomplish reclamation objectives. A diagram showing how waste rock will be arranged in the mine and the final grade of the reclaimed area is a mandatory part of the reclamation plan. Reclamation includes filling and stabilizing the quarry, spreading waste rock across the quarried area, adding any topsoil and vegetation removed during excavation, and planting native vegetation. Overburden soil has been and would continue to be saved for use during later reclamation of the quarry. The soil would be pushed back into the quarry benches and floors and planted with erosion-preventing, native grasses and other vegetation when the excavation is completed. The slope of the reclaimed quarry area would be between zero and ten percent. Portions of the quarry could be reclaimed in stages, depending on the final quarry excavation

plan. ODOT has the option of hiring specialists to help with the revegetation portion of the reclamation or providing funding for FS assistance. The reclamation plan would follow the water and erosion control, soil salvage and replacement, and land shaping and revegetation best management practices described in the DOGAMI Mineral Land Regulation and Reclamation Program's manual aggregate mines (Open-File Report O-96-2). DOGAMI requires a reclamation plan to be submitted as part of the Division 30 Operating Permit application.

1.5 PURPOSE AND NEED

The purpose of the proposed action is to secure a long-term, economical source of rock material for the FS and ODOT to use on highways and forest roads near Mt. Hood. Current and near-term demand by ODOT and the FS is projected to exceed supply from ODOT and FS sources. Commercial sources are generally more expensive.

ODOT and the FS estimate that more than two million cubic yards of rock would be needed over the next 20 years for highway and road maintenance, construction, and emergency repairs, as well as for road closures and stream and other site restoration projects in the Mt. Hood area. ODOT (Regions 1 and 4) has historically utilized and predicts to continue to need approximately 40,000 cubic yards of material each year for sanding Mt. Hood area roadways (Hay, pers. comm., 2005). Planned road improvement projects and emergency repairs would require an additional approximate average of 50,000 cubic yards of material each year (Hay, pers. comm., 2005). Table 1-1 shows estimated material needs for the FS and ODOT Regions 1 and 4.

Table 1-1. 20-Year Estimated Material Needs for FS and ODOT

	Maintenance/Sanding	Construction	Emergency
FS	250,000	0	0
ODOT Region 1	500,000	322,000	400,000
ODOT Region 4	240,000	310,000	200,000
Total	990,000	632,000	600,000

The FS has had a long successful partnership with ODOT in providing public access to the Mt. Hood area. This partnership is important because a significant portion of the traffic in this area is from the public utilizing the many year round recreational opportunities in this portion of the Forest. Providing a dependable source of rock material for highway construction and maintenance helps meet the goals of both agencies in providing access to recreational opportunities. This is especially true for sanding material where a significant portion of the wintertime traffic is for snow related recreation.

ODOT has been faced with a nearly constant need for highway construction and maintenance materials on US 26 and OR 35 near Mt. Hood. This need became especially apparent after the October 2000 flood, which washed out portions of OR 35. During the emergency repair work it was estimated the cost of the material needed for riprap would total almost $240,000 if secured

from the closest commercial source. The FS agreed to supply the rock material but recognized that expansion of existing sources would be necessary to meet future demand. ODOT has expressed that, in order to provide a safe and cost-efficient highway system near Mt. Hood, a secure, long-term source of material near Mt. Hood is essential. The need for sanding material has also become critical since the previous primary source of material (White River) is no longer available.

Through analysis, ODOT and the FS have determined that the site of the Tamarack Quarry is preferred over other quarry sites in the vicinity of Mt. Hood. Tamarack Quarry has the potential to be a relatively large quarry. It has been excavated and managed in a manner that facilitates continued excavation and appears to have reserves of quality source rock. The quarry has a relatively short haul route (approximately 3.1 miles) to US 26. However, the size of the existing quarry is inadequate to provide the amount of rock material needed over the next 20 years. Therefore, the quarry needs to be expanded.

1.6 DECISIONS TO BE MADE

The FS will decide whether or not to expand the quarry and, if the decision is to expand, to determine the extent of the quarry expansion.

1.7 MANAGEMENT DIRECTION

1.7.1 Mt. Hood National Forest Plan

The project area is within the Mt. Hood National Forest and is subject to the forest-wide standards and guidelines of the Land and Resource Management Plan (LRMP) for the Mt. Hood National Forest (FS, 1990). This FEIS is tiered to the FEIS that was prepared for the LRMP.

The project area land management allocation designations for the quarry and proposed expansion area are “B2, Scenic Viewshed” and “C1, Timber Emphasis.” Forest-wide standards and guidelines that apply to the project area include those related to soil productivity; air quality; water quality; riparian areas; fisheries; forest diversity; threatened, endangered, and sensitive plants and animals; wildlife; forest protection and public safety; transportation systems and facilities; travel and access; dispersed recreation; visual resource management; cultural resource management; human rights; special uses; and special forest products.

1.7.2 Northwest Forest Plan

In 1993, President Clinton directed an interagency task force (the Forest Ecosystem Management Assessment Team, or FEMAT) to identify management alternatives to resolve ongoing disputes about the management of federal forest lands in the range of the northern spotted owl. The management alternatives needed to comply with existing laws, take an ecosystem approach to managing for biological diversity, and produce the highest contribution to economic and social well-being. The plan applies to over 24 million acres of public land managed by the FS and Bureau of Land Management (BLM), including Mt. Hood National Forest land. The *Record of*

Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and the *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl* (Northwest Forest Plan) (FS and BLM, 1994) apply to the project area. This analysis is tiered to the EIS that was prepared for the Northwest Forest Plan.

The project area is located on the land management designation "Matrix," which allows for activities such as timber harvest and mineral exploration and is subject to the standards and guidelines of the Northwest Forest Plan.

A portion of the Northwest Forest Plan was modified by the *Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures standards and Guidelines* (2001 Survey and Manage ROD) (FS and BLM, 2001). This ROD amended a portion of the Northwest Forest Plan by adopting new standards and guidelines for Survey and Manage, Protection Buffers and other mitigation measures.

A portion of the Northwest Forest Plan was again modified by the *Record of Decision to Remove or Modify the Survey and Manage Mitigation Standards and Guidelines* (Survey and Manage ROD) (FS and BLM, 2004a). The 2004 Survey and Manage ROD removed the Survey and Manage Mitigation Standards and Guidelines, replacing them with Special Status Species Policies. However in January of 2006 a court decision in the Western District of Washington (CV No. 04-844P) set aside this Record of Decision and reinstated the 2001 Survey and Manage ROD including any amendments or modifications that were in effect as of March 21, 2004.

A portion of the Northwest Forest Plan was modified by the march 2004 *Record of Decision Amending Resource Management Plans for Seven Bureau of Land Management Districts and Land and Resource Management Plans for Nineteen national Forests Within the Range of the Northern Spotted Owl, Decision to Clarify Provisions Relating to the Aquatic Conservation Strategy* (FS and BLM 2004b). This ROD clarified the proper spatial and temporal scale for evaluating progress toward attainment of ACS objectives and clarified that no project level finding of consistency with the ACS objectives is required.

1.8 PUBLIC INVOLVEMENT

Notices of the proposed action and DEIS were published in the Federal Register (January 15 and May 2, 2002). The project was also listed in the Mt. Hood National Forest's quarterly publication that announces proposed actions in Fall 2002 thru Summer 2005. This quarterly announcement is mailed to approximately 300 groups and individuals and is also available online. The first Federal Register publication was a notice of intent to prepare the EIS. The second publication was a notice of title change (from Palmer Quarry to Tamarack Quarry). Notice of the proposed action was also posted on the Mt. Hood National Forest website: (www.fs.fed.us/r6/mthood, under "publications"). No comments were received following the notices.

The project was presented at a public open house on December 5, 2002, at the Mt. Hood National Forest Headquarters in Sandy, Oregon. Several people provided verbal comments at the open house, and the FS received one written comment. Key issues raised are summarized in Section 1.9.

An open house with the proposed project and other projects was held on May 13, 2004, at the Lions Club in Welches, Oregon. No public comments on the proposed project were received.

The DEIS was released for public comment on July 2004. Four letters were received and are included along with responses in Appendix G.

1.9 KEY ISSUES

NEPA directs federal agencies to focus analysis and documentation on the significant issues related to a proposed action. The scoping process resulted in the identification of some potential issues to be addressed in the DEIS. They are listed below.

Scenic Resources: What are the potential project effects on views from key viewpoints on the Mt. Hood National Forest?

Timberline Lodge, a National Historic Landmark, is located at the tree line of the south flank of Mt. Hood. Removing additional vegetation and rock material from the Tamarack Quarry may make the quarry visible from Timberline Lodge. The lodge is one of the most visited sites in Oregon and offers visitors panoramic views of the Cascade Mountains. If the rock quarry were visible it would have the potential to degrade this view. Effects will be measured by using computer simulation models to compare the existing view with the view that would result from the alternatives considered.

Transportation/Access: What is the potential for increased traffic conflicts between commercial vehicles (i.e., trucks hauling rock) and recreation use (e.g., vehicles entering/leaving Trillium Lake Campground)?

This area of the Forest is a popular recreation area in both the summer and winter. Expanding the quarry would have the potential to increase vehicle traffic in this area and thereby increase vehicle conflicts between commercial users and recreation users. Effects will be measured by evaluating any changes in traffic volumes and patterns and any changes to the road system accessing this area.

Recreation: *What effects would the project have on cross-country ski trails in the vicinity of the quarry?*

This area is a popular cross-country skiing in the winter. Expanding the quarry could impact some cross-country trails and alter that recreation use. Effects will be measured by identifying the existing ski trails and evaluating the impacts, if any, that would occur with the alternatives under consideration.

Threatened and Endangered Species: Would the project result in adverse effects to any species listed or proposed for listing under the Endangered Species Act?

Several federally listed species occur on the Mt. Hood National Forest, including the northern spotted owl, bald eagle, chinook salmon, and steelhead. The quarry expansion would clear several acres of forest, and quarry activities would generate noise. Potential impacts will be measured by identifying listed species that could occur in the project area, determining how they may use the area, and assessing the biological effects of the alternatives through consultation with the responsible agencies.

1.10 OTHER ACTIONS AND PERMITS

If an alternative other than the No Action Alternative is selected, a number of other discretionary actions may be required prior to project implementation. Those actions include:

- Issuance of Special Use Permits from the FS to ODOT
- US Fish and Wildlife Service (USFWS)—Endangered Species Act (ESA) Section 7 consultation for effects to the northern spotted owl (Appendix D)
- Obtaining a Simple Air Contaminant Discharge Permit (ACDP) from the Oregon Department of Environmental Quality (DEQ) for rock crushing operations
- Obtaining a DOGAMI Division 30 Operating Permit for the expansion area

Tamarack Quarry Expansion Project

Final Environmental Impact Statement

Chapter 2
Alternatives

Changes between Draft and Final EIS:

(Minor corrections, clarifications, and edits are not included in this list.)

- Added reference to reclamation plan.

2 ALTERNATIVES

2.1 INTRODUCTION

This chapter describes the alternatives being considered and those eliminated from further study and why. It also describes how the alternatives differ in responding to the key issues listed in Section 1.9.

The alternatives were developed cooperatively by the FS and ODOT. Three alternatives are analyzed. Alternative 1 was developed with the objective of maximizing the amount of material that could be obtained from the quarry while still complying with applicable regulations. Alternative 2 modifies Alternative 1 to address the key issues raised through scoping while still providing enough rock to meet the identified needs. The third alternative is the No Action Alternative.

The three alternatives selected for further evaluation are practical or feasible in terms of technical factors, economic factors, and resource capability.

2.2 ALTERNATIVES CONSIDERED IN DETAIL

2.2.1 Alternative 1

Alternative 1 would expand the Tamarack Quarry by approximately 41 acres more than what is currently permitted, for a total area of approximately 70 acres (see Figure 2). Expansion would occur to the north and east of the existing quarry as shown on Figure 2. All existing vegetation would be removed within the 41-acre expansion area. Rock would be excavated first from the remaining seven acres in the currently permitted area, then in the expansion area. The excavated material would be used by ODOT and the FS for road maintenance and construction, including improvements to US 26 and OR 35. The amount of material ODOT would remove each year could range from fewer than 40,000 cubic yards to more than 100,000 cubic yards. According to preliminary estimates by the FS, the total expanded quarry area with Alternative 1 would contain in excess of two million cubic yards of material. Based on extracting 100,000 cubic yards per year, ODOT and the FS would use the quarry for 20 years or more.

Activities would include clearing vegetation, blasting, rock crushing, screening, batching, loading and hauling, importing excess materials (e.g., soils for reclamation and rock from off-site), and some short-term stockpiling of excavated rock and soils. Table 2-1 shows when various activities would be permitted. No noise-generating or hauling activities would occur at night, on weekends, during holidays, or any time between the first measurable snowfall and mid-April, except for emergencies. ODOT would be responsible for plowing two lanes with turnouts on the haul route, as needed, as early as the second full week of April. Typically the FS opens the road one or two weeks prior to Memorial Day weekend.

Table 2-1. Dates and Times During which Quarry Activities Would Be Permitted

Activity	Dates	Days and Hours*
Blasting	July 16 – first measurable snowfall (typically in November)	Mon.-Thu. 10 AM to 5 PM Fri. 10 AM to 12 PM
Crushing Screening Batching	Mid-April – first measurable snowfall (typically in November)	Mon.-Thu. 7 AM to 7 PM Fri. 7 AM to 12 PM
Blast Day Preparation Batch Plant Daily Preparation Equipment Repair General Equipment Maintenance (fueling and servicing) Dust Abatement (pre- and post-shift each day)	Mid-April – first measurable snowfall (typically in November)	Days and hours not restricted
Hauling (i.e., large trucks, including semis and rock trucks, on the haul route) Loading	Mid-April – first measurable snowfall (typically in November)	Mon.-Thu. 7 AM to 5 PM Fri. 7 AM to 12 PM

* *No activities would be permitted on federal holidays. Restrictions could be modified after Labor Day subject to approval by the FS.*

To minimize potential conflicts with recreation traffic, hauling would not occur on weekends beginning on Fridays at noon, or on federal holidays, unless the quarry is being used for emergency road repairs. When hauling would occur, ODOT would implement traffic control measures (e.g., flagging, temporary signage).

No improvements would be made to the haul route except for routine maintenance, which may include resurfacing, structural repairs, striping, placement of safety reflectors, and placement of additional traffic signs. ODOT would pay for a commensurate portion of haul route maintenance. Traffic control, which may include flaggers and signs, would be implemented during hauling. Typical hauling trucks have a 20-cubic-yard capacity. No culvert replacements, road widening, pull-out or turn-around construction would occur as part of this alternative.

To provide a better trail connection and continued year-round use of the quarry for recreation, the FS would relocate the Quarry Connector trail around the quarry and maintain it for winter cross-country skiing (suitable for beginner to intermediate skiers) and summer mountain biking use (suitable for intermediate bikers), as part of the proposed project. ODOT would pay for the trail relocation. The route would be at a grade of less than eight percent with rest grades approximately every 200 feet to accommodate mountain bikers in the summer use season. It would be suitable for grooming with a snow groomer. Quarry operations would maintain the designed location and grade of the route into the future.

See Figure 2

Under Alternative 1 (as with Alternative 2), a reclamation plan has been developed by the FS and ODOT, and would be implemented and updated as expansion occurs. A copy of this plan is in Appendix G. Overburden soil has been and would continue to be saved for use during later reclamation of the quarry. The soil would be pushed back into the quarry benches and floors and planted with erosion-preventing, native grasses and other vegetation when the excavation is completed. Portions of the quarry could be reclaimed in stages, depending on the individual updates of the quarry development plan.

2.2.2 Alternative 2

With Alternative 2, the Tamarack Quarry would be expanded by approximately 21 acres over the currently permitted 29 acres, for a total area of approximately 50 acres. The expansion would occur primarily toward the north and east, as shown on Figure 2, but the smaller expansion area would reduce visual impacts of the quarry when viewed from the Timberline Lodge area. All existing vegetation would be removed within the 21-acre expansion area. Rock would be excavated first from the remaining seven acres in the currently permitted area, then from the expansion area. The excavated material would be used by ODOT and the FS for road maintenance and construction, including improvements to US 26 and OR 35. The amount of material ODOT would remove each year could range from fewer than 40,000 cubic yards to more than 100,000 cubic yards. According to preliminary estimates by the FS, the total quarry area with Alternative 2 would contain up to two million cubic yards of material. Based on extracting 100,000 cubic yards per year, ODOT and the FS would use the quarry for approximately 20 years.

Activities would be similar to those described for Alternative 1, with timing restrictions as shown in Table 2-1. Blasting would be allowed after July 15 only. No noise-generating or hauling activities would occur at night, on weekends, during holidays, or any time between the first measurable snowfall and mid-April, except for emergencies. ODOT would be responsible for plowing two lanes with turnouts on the haul route, as needed, as early as the second full week of April. Typically the FS opens the road a week or two prior to Memorial Day weekend.

To minimize potential conflicts with recreation traffic, hauling would not occur on weekends beginning on Fridays at noon, or on federal holidays, unless the quarry is being used for emergency road repairs. When hauling would occur, ODOT would implement traffic control measures (e.g., flagging, temporary signage).

The Quarry Connector trail would be relocated, as described under Alternative 1.

Similar to Alternative 1, no improvements would be made to the haul route except for routine maintenance, which may include resurfacing, structural repairs, striping, placement of safety reflectors, and placement of additional traffic signs. ODOT would pay for a commensurate portion of haul route maintenance. Traffic control, which may include flaggers and signs, would be implemented during hauling. Typical hauling trucks have a 20-cubic-yard capacity. No culvert

replacements, road widening, pull-out or turn-around construction would occur as part of Alternative 2.

A reclamation plan has been developed by the FS and ODOT, and would be implemented as expansion occurs. Generally, reclamation would occur as described for Alternative 1.

2.2.3 No Action Alternative

The quarry would not be expanded under the No Action Alternative. The FS would be the primary user of the quarry and would continue to extract rock from the site within the existing permitted boundaries (approximately 29 acres). The FS estimates that the existing quarry would yield approximately 750,000 additional cubic yards of material.

To meet projected needs maintenance and construction projects, the FS may need to supplement the material removed from the Tamarack Quarry with material from other sources, and ODOT would need to obtain material from other sources. Those sources may include other quarries in the Forest as well as private, commercial suppliers.

Currently, ODOT has only one private supplier as a potential source (Barnhart, pers. comm., 2003). It is the nearest commercial quarry to the Mt. Hood area and is approximately 20 miles from Tamarack Quarry. Other commercial suppliers are considerably farther from the area, and transporting rock from those suppliers would be cost-prohibitive (Barnhart, pers. comm., 2004). Current price is approximately $16 per cubic yard of material (Barnhart, pers. comm., 2003). Assuming ODOT uses an average of 100,000 cubic yards of material each year, the annual cost of using a private supplier would be in excess of $1.6 million.

Activities within the existing permit area would be similar to those described for Alternative 1, although less activity would occur each year with the FS as the primary user. Activities, including hauling, would occur on weekdays (Mondays through Thursdays from 7:00 a.m. to 5:00 p.m., and Fridays from 7:00 a.m. to noon) during the spring, summer, and fall when the haul road is clear of snow. Blasting would be allowed only after July 15 of each year. The haul route would receive normal maintenance. Expansion to the currently permitted boundaries would affect the Quarry Connector trail, which would be relocated under the No Action Alternative.

The quarry is operated under a DOGAMI permit (permit number 03-0092). DOGAMI has a reclamation plan on file for the quarry. According to the reclamation plan for the No Action Alternative, reclamation would begin 30 days after mining is completed at the quarry. Topsoil and overburden piles would be seeded for stabilization, and all areas where overburden is replaced would be stabilized. Because natural landform and existing vegetation provide screening for the quarry, additional screening would not be needed. A vegetated buffer of at least 1,000 feet would provide screening around the entire quarry once mining is completed. All structures, equipment, and refuse would be removed from the site prior to completing reclamation. Benches would be cut into vertical slopes. Topsoil would be stored on-site, then replaced and seeded with

species recommended by the FS. Planting methods and times would also be in accordance with FS recommendations.

2.2.4 Summary of Alternatives

Table 2-2 compares the project alternatives.

Table 2-2. Summary of Alternatives under Consideration

	Acres of Expansion	Total Quarry Acreage	Cubic Yards of Rock Excavated	Years to Complete Mining[2]	Primary User
No Action Alternative	0 (7) [1]	29	750,000	75	FS
Alternative 1	41	70	more than 2 million	20 or more	ODOT
Alternative 2	21	50	up to 2 million	20 or more	ODOT

[1]There would be no expansion of currently permitted quarry boundaries. However, 29 acres are currently permitted, although only 22 acres currently are being actively quarried.

[2]Years are based on FS estimates of available rock quantities, ODOT's estimates of extracting 40,000 to 100,000 cubic yards per year, and FS estimate of extracting up to 10,000 cubic yards per year.

2.3 ALTERNATIVES ELIMINATED FROM DETAILED STUDY

In developing this proposal to provide for an economical long-term rock material source near US 26 for ODOT and the FS, several other sites were considered. In 2002 engineers from both ODOT and the FS evaluated the other quarries that are within an economical hauling distance of US 26 and OR 35. Although most of those quarries are being used and will continue to be used to some extent, they would not meet the identified need for the proposed action for a variety of reasons. The other quarries and the reasons for eliminating them from further consideration are summarized in Table 2-3.

Table 2-3. Alternative Sites Eliminated from Further Study

Quarry Site	Location	Adequate Quantity?	Material Quality	Constraints	Reasons for Eliminating
Laurel Hill	T3S, R8E Section 16	No, very small quarry	Good	Visual impacts and safety along US 26	This site was eliminated because it does not contain an adequate quantity of material and would be difficult to develop because of location next to US 26. It is currently being used as a disposal site.
Skyline	T1S, R11E Section 31	No, this is a small site	Good	Located next to creek and The Dalles Municipal Watershed	This site was eliminated because it does not contain an adequate quantity of material and environmental constraints of the riparian area and the municipal watershed.
Shell Rock	T1S, R10E Section 27	Yes, relatively large site	Poor	Visual impacts along Road 17 and adjacent to The Dalles Watershed	This site was eliminated because of the poor quality of material and the environmental constraints of visual impacts along Road 17 and the municipal watershed.
Kiyi	T1S, R10E Section 2	No, very small site	Good	Undeveloped site, located near several creeks	This site was eliminated because it does not contain an adequate quantity of material, and developing the site would be very expensive and would not be consistent with the LRMP standard of utilizing existing sites before developing new ones.
Jackey	T4S, R9E Section 28	No, this is a small site	Good	Limited space for processing, located near Frog Creek	This site was eliminated because it is too small to provide a long-term rock source.

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Final Environmental Impact Statement

Chapter 3

Affected Environment and Environmental Consequences

Changes between Draft and Final EIS:

(Minor corrections, clarifications, and edits are not included in this list.)

- Added references to reclamation plan.
- Revised northern spotted owl section per public comment.
- Revised mitigation measures for northern spotted owl in accordance with USFWS concurrence letter.
- Revised MIS section per public comment.
- Clarified winter emergency use per public comment.
- Incorporated reference to Senator Wyden's 2004 proposed wilderness area.
- Updated discussion of federally listed anadromous fish species.
- Updated discussions of survey and manage species.
- Updated discussion on management direction for controlling noxious weeds.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This chapter describes the existing conditions of the environment that could be affected by each of the alternatives under consideration, as well as the potential effects of those alternatives. The existing conditions information provides a basis for evaluating the environmental consequences of implementing each alternative. This chapter also describes mitigation measures, which would be implemented to lessen project impacts.

The quarry elevation ranges from 3,600 feet to 3,840 feet. Vegetation within the project area is within the Pacific Silver Fir Zone (FS, 1982). Remnant late seral Douglas-fir trees are scattered throughout the proposed expansion area and constitute what remains of the overstory canopy. Pacific silver fir, western hemlock, mountain hemlock, and western red cedar occur in the midstory and understory. Pacific rhododendron dominates most of the expansion area with scattered areas dominated by huckleberry. The herb layer is sparse with bear-grass as the dominant herb. There is a high level of large down logs in the project area, with all size and decay classes represented.

3.2 SUMMARY OF EFFECTS ON KEY ISSUES

Table 3-1 shows a summary of the expected effects of each alternative on the key issues identified during scoping.

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Table 3-1. Summary of Effects on Key Issues

Issue	Alternative 1	Alternative 2	No Action Alternative	Criteria
Scenic Resources: What are the potential project effects on views from key viewpoints, such as Timberline Lodge, on the Mt. Hood National Forest?	Neutral effect. Portions of quarry would be visible from Lodge but would be subordinate to character of natural landscape. Quarry would not be visible from Trillium Lake area.	Neutral effect. Portions of quarry may be visible from Lodge but would be subordinate to character of natural landscape. Quarry would not be visible from Trillium Lake area. Less visual impact than Alternative 1.	Neutral effect. Quarry would not be visible from Lodge or Trillium Lake area.	Visual Quality Objective (VQO) of Partial Retention: evidence of human activity is permissible but subordinate to character of natural landscape achieve VQO = neutral effect; exceed VQO = beneficial effect failure to achieve VQO = adverse effect
Transportation/Access: What is the potential for increased traffic conflicts between commercial vehicles and recreation use?	Winter recreation: no conflicts except in emergencies. Summer recreation: the worst-case scenario is 1 truck trip (entering or leaving) every 2 minutes during hours of operation (285 trips per day); typical day is 1 truck trip every 12 minutes (53 trips per day). Safety issues due to lack of off-road pedestrian and bicycle facilities. No changes to local road system.	Same as Alternative 1 because rock would be extracted and processed as needed under either alternative.	May result in trucks traveling more miles on US 26 in the Mt. Hood area, because ODOT would rely on sources farther away from the US 26/OR 35 Mt. Hood vicinity. Safety issues due to lack of off-road pedestrian and bicycle facilities. No changes to local road system.	N/A

Issue	Alternative 1	Alternative 2	No Action Alternative	Criteria
Recreation: What effects would the project have on cross-country ski trails in the vicinity of the quarry?	Winter plowing of the haul route during emergency situations before April 15 would displace activity on the main portions of the Trillium Lake Loop cross-country ski trail. Relocation of the Quarry Connector trail around the quarry for winter cross-country skiing (suitable for beginner to intermediate skiers) and summer mountain biking use (suitable for intermediate bikers).	Winter plowing of the haul route during emergency situations before April 15 would displace activity on the main portions of the Trillium Lake Loop cross-country ski trail. Relocation of the Quarry Connector trail as in Alternative 1.	Potential for winter plowing that would interfere with Trillium Lake Loop cross-country skiing only during emergencies. Relocation of the Quarry Connector trail as in Alternative 1.	N/A
Threatened and Endangered Species: Would the project result in adverse effects to any species protected by the Endangered Species Act?	Northern spotted owl: may affect, not likely to adversely effect. Bald eagle: no effect. Canada lynx: no effect.	Same as Alternative 1.	Same as Alternative 1.	Northern spotted owl: dispersal habitat may be removed and operations may disturb nesting owls after the critical nesting period. Bald eagle: no removal of bald eagle nesting, winter roosting or foraging habitat; assumed that project noise would not impact non-breeding eagles. Canada lynx: no habitat present.

3.3 SCENIC RESOURCES

This section summarizes information on existing scenic resources, management direction, and potential effects of the alternatives under consideration. Additional information is available in the Visual Resources Technical Report in Appendix A.

3.3.1 Existing Conditions

3.3.1.1 Scenic Resource Management

The LRMP and the Final Environmental Impact Statement (FEIS) for the LRMP provide the primary direction for management of scenic resources on the project site. The plan designates the existing quarry as C1 Timber Emphasis and the surrounding landscape as B2 Scenic Viewshed, specifically the Timberline Lodge Viewshed with the viewer position being the lodge and the background extending to approximately twelve miles (FS, 1990). The C1 designation applies to areas currently screened from Timberline Lodge by the existing landform. Both of the Action Alternatives would remove portions of the landform and expose C1 areas to view from the lodge. Therefore, for the purposes of this study, the areas that would become visible through the proposed Action Alternatives are considered part of the B2 Scenic Viewshed.

Visual Quality Objectives (VQOs) are established in the LRMP and describe the degree of acceptable alteration to the landscape in terms of visual contrast with the surrounding landscape within Distance Zones from selected viewer positions (FS, 1990).

Management activities must be consistent with the prescribed VQO for the viewshed shown in Table 3-2.

Table 3-2. Timberline Lodge Viewshed Visual Quality Objectives

Distance Zone	Distance from Key Viewing Area	Visual Quality Objective
Foreground	up to 0.5 mile	Retention
Middleground	0.5 to 5 miles	Partial Retention
Background	beyond 5 miles	Partial Retention

Desired future conditions have been established in the LRMP. Given the key viewing area of Timberline Lodge (see Section 3.3.1.3), which is located approximately 5.7 miles north of the quarry, the Middleground and Background objectives of Partial Retention apply to the management intensity for the project. The LRMP provides specific direction for these objectives:

- Natural appearing forest landscape, with little evidence of human alteration
- Dominant visual impression is mostly continuous tree canopies, with diversity in occasional natural appearing openings

- Mosaic of species and age classes add texture and color contrast in natural patterns
- Management activities repeat form, line, color and texture common to the characteristic landscape

3.3.1.2 Landscape Setting

Recreational activities abound in the Mt. Hood National Forest with nearby trails, roads, rivers, lakes, campgrounds, and ski areas. US 26 and OR 35 serve as the major access corridors to the area; numerous FS roads provide a well-used network throughout the project vicinity. The site is approximately 1.5 miles south of Trillium Lake, which receives significant, year-round recreation. Historically, the Salmon River Watershed has been used by American Indians as a major huckleberry picking area, particularly in the Sherar Burn, Mud Creek, and High Rock areas (FS, 1995). The Sherar Burn area (an area burned by wildfire approximately 70 years ago) is still used by American Indians for huckleberry picking and bear grass harvesting, and by recreation users for berry picking. There are no mature trees to screen the view of the quarry from the Sherar Burn.

The project is in an area of high visual quality importance, dominated with mature Douglas-fir forest. Snow-capped peaks of Mt. Hood, Mt. Jefferson, and ridgelines in the Cascade Range augment the area's scenic quality. Timber harvest activities have resulted in an unnatural patchwork pattern in several areas and create strong visual contrast when viewed from Timberline Lodge. Trillium Lake, also viewed from Timberline Lodge, creates a distinct, natural appearing contrast amid the surrounding forested landscape.

Climatic conditions vary dramatically and affect the visual environment. The vicinity receives a significant amount of rain and snow annually. Fog and low clouds are common and block views beyond the foreground. Haze and smoke may also affect the seen environment depending on local conditions. During exceptionally clear winter weather, snow glare may affect the views in the foreground and exacerbate contrast in the middle and background.

3.3.1.3 Key Viewing Areas

Conversations with FS staff, a review of relevant and available mapping, visitor use information, limited geographic information system (GIS) spatial analyses, and public comment led to the conclusion that Timberline Lodge is the only key viewing area for this project. Therefore, the following discussions on landform and waterform, effects, and impacts are presented in the context of being viewed from Timberline Lodge.

The key viewing area for the analysis is from the "picture window" on the second floor of the main entrance to Timberline Lodge.

The campground and dam at Trillium Lake are also considered important viewing areas, as are Sherar Burn Road and the Salmon River corridor. Therefore, limited analysis was conducted to determine potential visual impacts of the project from those areas.

3.3.1.4 Landform

The surrounding landform is mountainous and bold, typical of the Cascade Range. The jagged peak of Mt. Jefferson and distant ridges to the south are silhouetted against the skyline as shown on Figures 3 and 4.

As viewed from Timberline Lodge, the foreground features strong, interesting contrast in form, line, color, and texture created by the juxtaposition of mature forest canopy, snags, ski runs, the slopes of Mt. Hood, talus, the horizon line, and middleground/background imagery. Structures associated with the lodge, such as buildings, ski lifts, utilities, and other hardscape elements, are part of the existing landscape character.

The existing quarry, viewed from the lodge, is tucked behind a ridgeline and is not visible. A small, forested knoll north of the quarry has the potential to screen or partially screen the proposed expansion from view. Undulating horizontal bands of color, shadow, and texture create visual interest in the middleground and background as forested slopes fade into the distance. Colors fade from dark green to blue and gray depending on light conditions. Several prominent buttes and ridgelines dominate the middleground. Previous timber harvest practices have resulted in an unnatural-appearing patchwork plainly visible from the lodge. A short section of FS road 266-130 is visible east of Trillium Lake during winter conditions and appears as a natural scar on the landscape. Mt. Jefferson's silhouette on the horizon creates a focal point in the distant background.

3.3.1.5 Waterform

Trillium Lake is the only water body visible from the key viewing area. It creates strong, natural appearing contrast in color and texture against the dark green forest canopy. The lake also provides a middleground focal point throughout the year.

3.3.2 Potential Impacts

The primary criterion for determining the project's effect is the VQO that will result from the proposed action (i.e., implementing one of the project alternatives). Failure to achieve the VQO specified in the management guidelines would result in an "adverse" effect. Achievement of the specified VQO would result in a "neutral" effect, and achievement of a VQO higher than that specified would result in a "beneficial" effect.

The visual simulations presented in this section are of the view from the picture window at Timberline Lodge. When viewing the visual simulations included in this section, it is important to note that the simulations have been based on US Geological Survey (USGS) 7.5-minute quadrangle contour lines and use the 10-meter grid digital elevation model (DEM) provided by

the FS. The simulations are intended to best represent future conditions for both Action Alternatives using the available information. The actual appearance of the quarry upon completion of expansion may vary from the visual simulations.

3.3.2.1 Alternative 1

Visual simulations from Timberline Lodge of Alternative 1 in winter and summer conditions are shown on Figure 5 and Figure 6, respectively. They depict two visible areas of the expanded quarry. The simulations present a worst-case scenario in that they show the expansion at its maximum limits, with no revegetation, even though the reclamation plan requires the importation of topsoil and revegetation of the site. The photograph used in the winter simulation was intentionally taken on a clear winter day to intensify the potential contrast in color between the snowy white quarry openings and the surrounding forest canopy.

When compared against the existing landscape character, Alternative 1 would result in low contrast in form and line, and low contrast in texture. Color contrast would be high in winter and moderate in summer. The form, line, and texture of the proposed expansion would be generally consistent with other openings in the viewshed. Although contrast in color would be high, the openings would mimic the appearance of Trillium Lake in winter conditions. Contrasts in color would likely become negligible as the reclamation plan to establish vegetation is successfully executed. Reclamation could occur in stages, so that portions of the quarry would be revegetated as the rock source is exhausted.

Under Alternative 1 (as with Alternative 2), a reclamation plan has been developed by the FS and ODOT, and would be implemented and updated as expansion occurs. Overburden soil has been and would continue to be saved for use during later reclamation of the quarry. The soil would be pushed back into the quarry benches and floors and planted with erosion-preventing, native grasses and other vegetation when the excavation is completed. Portions of the quarry would be reclaimed in stages, as detailed in the final quarry reclamation plan.

Given the distance of approximately 5.7 miles from Timberline Lodge to the quarry, it is not likely that batching and stockpiling operations or equipment could be observed with the naked eye. Ample opportunity exists at the quarry to keep batch facilities and stockpiles screened from view using topography. The haul route is not visible from the lodge, so no effect is anticipated from additional traffic along the haul route. Dust from rock extraction, crushing, screening, batching, loading, and hauling would cause localized air quality impacts to the Trillium Lake basin area. FS road 2656 is paved. The amount of dust created would be minimized by sprinkling when necessary, so dust would not create significant adverse visual impacts. The distance from the lodge to the quarry further reduces the likelihood of visual impacts from dust. It is highly unlikely that exhaust from equipment would cause a plume that would be visible from Timberline Lodge, as typically exhaust plumes do not appear unless there is a large concentration (more than 20) of heavy vehicles that are idling simultaneously in one location (Moore, M., pers. comm., 2004). ODOT would have fewer than a half-dozen vehicles operating at any one time.

See Figure 3.

See Figure 4.

See Figure 5.

See Figure 6.

The existing quarry is visible from the Sherar Burn huckleberry and bear grass harvesting area, and the proposed expansion would create more of a visual impact to users' experience. Due to the lack of trees in the Sherar Burn area and the topography between that area and the quarry, views of the quarry from Sherar Burn could not be screened. As reclamation of the quarry is implemented, visual impacts would be reduced. Sherar Burn is not a key viewing area.

The expanded quarry would not be visible from Trillium Lake, the campground, or the dam—or the Salmon River corridor. Vegetation and topography would screen views of the quarry from these areas.

In the short term, Alternative 1 would not directly affect the scenic environment because it would be approximately 10 to 15 years before the quarry expansion would daylight into the knoll and sideslopes that currently screen the quarry from the lodge. Long-term effects to the scenic environment, when compared to the existing landscape character, would be consistent with the VQO of Partial Retention (evidence of human activities is permissible, but is subordinate to characteristics of the natural landscape). Even though the quarry expansion area would be partially visible, it would be subordinate to the characteristics of the natural landscape.

3.3.2.2 Alternative 2

Visual simulations from Timberline Lodge of Alternative 2 in winter and summer conditions are shown on Figure 7 and Figure 8, respectively. They depict two small areas of the expanded quarry that appear as horizontal slivers on the landscape. Similar to Alternative 1, the winter simulation (Figure 7) also presents a worst-case scenario in that it shows the expansion with no revegetation and in bright, winter conditions.

While the simulation indicates that small portions of the expansion would be visible, the level of detail in the 10-meter DEM and USGS contour information used to model the simulations makes it very difficult to determine the exact line at which the expansion would become visible. The resolution of the available information is not high enough to enable an exact determination, but it does provide a good estimate of where that line might occur. Because the intent of Alternative 2 is to expand the quarry to a point just before it would become visible from the key viewing area (Timberline Lodge), monitoring the expansion to determine visibility from the lodge is discussed as a mitigation measure in Section 3.3.3.

For the purposes of this study, the visual impact analysis for Alternative 2 is based on the simulations in Figure 7 and Figure 8. It is anticipated that the actual impacts would be less than shown in the simulations because the expansion would be monitored and revised so as not to be visible from Timberline Lodge.

When compared to the existing landscape character, Alternative 2 would result in low contrast in form and line, moderate to low contrast in color, and low contrast in texture. The form, line, and texture of the proposed expansion would be generally less obtrusive than other openings in the viewshed. The contrast in color would be moderate to low because the extent of the impact would

be relatively small when compared to other openings such as Trillium Lake and clearcuts. Although the visible clearcuts were harvested 10 to 20 years ago, they have been slow to revegetate, and still present a contrast in color. In winter conditions, the quarry openings would also be similar in appearance to Trillium Lake. Contrasts in color would likely become negligible as the reclamation plan to establish vegetation is successfully executed. Reclamation could occur in stages, so that portions of the quarry would be revegetated as the rock source is exhausted.

Given the distance of approximately 5.7 miles from Timberline Lodge to the quarry, and the fact that most of the landform screening the expansion would be left in place, it is unlikely that batching and stockpiling operations or equipment would be visible. The proposed haul route is not visible from the lodge, so no effect is anticipated from additional traffic along the haul route.

Based on the simulation, the proposed action would not directly affect the scenic environment in the short term because it would be approximately 10 to 15 years before expansion activities breached the area visible from Timberline Lodge. Long-term effects to the scenic environment, when compared to the landscape character in 10 to 20 years, would be minor, if not negligible.

In summary, based on the visual simulations, Alternative 2 would meet the VQO of Partial Retention (evidence of human activities is permissible, but is subordinate to characteristics of the natural landscape) and would be less visible than Alternative 1. Furthermore, if mitigation measures to monitor and revise the expansion area are implemented, the quarry would not be visible from Timberline Lodge.

The existing quarry is visible from the Sherar Burn huckleberry and bear grass harvesting area, and the proposed expansion would create more of a visual impact to users' experience, although less of an impact than Alternative 1. Due to the lack of trees in the Sherar Burn area and the topography between that area and the quarry, views of the quarry from Sherar Burn could not be screened. As quarry reclamation is implemented, visual impacts would be reduced. Sherar Burn is not a key viewing area.

As with Alternative 1, the expanded quarry would not be visible from Trillium Lake, the campground, or the dam, or the Salmon River corridor, because vegetation and topography would screen the quarry from view.

3.3.2.3 No Action Alternative

Under this alternative, the FS would expand the quarry from its current size of approximately 22 acres to the existing permitted boundary of approximately 29 acres. Blasting, crushing, screening, batching, and loading would occur as with Alternatives 1 and 2. Based on the available information and modeling, the expansion area would not encroach far enough into the knoll and sideslopes for the No Action Alternative to be visible from Timberline Lodge. Therefore the No Action Alternative would meet the VQO of Partial Retention and have a neutral effect.

As noted above, the existing quarry is visible from the Sherar Burn area, and the expansion that would occur under the No Action Alternative would increase visual impacts to users' experience.

See Figure 7.

See Figure 8.

However, the impacts would be much less than under the Action Alternatives. Views of the quarry from Sherar Burn cannot be screened, but as quarry reclamation is implemented, visual impacts would be reduced. Sherar Burn is not a key viewing area.

The quarry would not be visible from the Salmon River corridor, or from Trillium Lake and its associated campground and dam because of topography and vegetation.

3.3.3 Mitigation Measures

Although both proposed Action Alternatives would meet the VQO of Partial Retention, the following mitigation measures could be implemented to mitigate and/or reduce potential impacts to the scenic environment.

1. Monitor expansion from Timberline Lodge to determine when impacts are becoming visible. The expansion project would take an extended period of time and would be accomplished in phases. Monitoring the success of reclamation efforts would help determine actual visual impacts by showing if reclaimed areas have been successfully re-vegetated before new areas are opened and become visible from Timberline Lodge. Monitoring the actual expansion footprint from the lodge would help determine where the limits of visibility occur.

2. Locate processing equipment and batching facilities on the lower levels of the quarry. Existing topography and vegetation could screen equipment and facilities placed on the quarry floor from view.

3. Augment forest cover on the north side of the expansion area. Supplementing existing vegetation with additional plantings would, in time, provide a screen for portions of the expansion area. The area would be planted when specific quarry development plans are proposed for the northernmost portion of the expansion area. Planting plans would be coordinated with a FS wildlife biologist to meet wildlife goals for the area.

3.4 TRANSPORTATION/ACCESS

3.4.1 Existing Conditions

The haul route to Tamarack Quarry is approximately 3.1 miles long and includes FS roads 2656 and 2656-955. FS road 2656 is surfaced with asphalt. FS spur road 955 is gravel surfaced. Both roadways are narrow with limited sight distance at several locations. Recreational users of Trillium Lake and surrounding areas generate the majority of traffic on FS roads 2656 and 2656-955. People recreating in the Trillium Basin use FS road 2656 for a variety of activities. Traffic includes large recreational vehicles (RVs) and automobiles as well as bicyclists and pedestrians. Many families and children camping in the area use the FS road 2656. The narrow roadway and limited sight distance make pedestrian and bicycle safety a concern.

Daily traffic counts on FS roads 2656 and 2656-955 are not available. However, use figures supplied by the Trillium Lake campground concessionaire show that in 2002, there were 17,078

campers during the year (Norman, pers. comm., 2003b). The Trillium Lake day use areas also are used heavily. The campground concessionaire reports that in 2002, there were 15,836 users (Norman, pers. comm., 2003b). Using a conservative assumption of two people per vehicle, 16,457 vehicles used the park facilities in 2002. Typical vehicle occupancy is likely to be higher than two people, which would mean that it is likely fewer vehicles used the facilities. The Trillium Lake campground is open and reservations are required from May 22 through September 2. Dispersed camping is available north of Trillium Lake at the intersection of Trillium Lake Road with Summit Meadows Road. Being recreational in nature, the majority of traffic on FS road 2656 and 2656-955 occurs Friday through Sunday and on holidays. Weekday traffic volumes on FS roads 2656 and 2656-955 is minimal. Average Daily Traffic (ADT) on US 26 east of Government Camp is 7,000 vehicles, which is well below the capacity of the roadway. Historical traffic counts indicate that traffic is growing at a compound growth rate of 1.5 percent per year.

The 2002 crash rate for US 26 in the vicinity (MP 54.23 to MP 57.52) of FS road 2656 (MP 55.74) is 0.53 crashes per million vehicle miles, which is below the statewide average for similar urban highways of 0.84 crashes per million vehicle miles. There are no locations on the Safety Priority Index System top 10 percent list.

3.4.2 Potential Impacts

3.4.2.1 Alternative 1

Expansion of the quarry would not change FS roads 2656 and 2656-955. No improvements would be made to the haul route except for routine maintenance, which may include resurfacing, structural repairs, striping, placement of safety reflectors, and placement of additional traffic signs. ODOT would pay for a commensurate portion of haul route maintenance. Traffic control, which may include flaggers and signs, would be implemented during hauling.

Under ODOT operation, activity at the Tamarack Quarry would increase. Activities would include clearing vegetation, blasting, rock crushing, screening, batching, loading and hauling, importing excess materials (e.g., from slides and ditch cleanings) for reprocessing or quarry reclamation, and short-term stockpiling of excavated rock and soils. Materials would be stockpiled on-site either for reprocessing or for use in reclamation. Sanding rock would be hauled out of the quarry and stockpiled at various locations: the junction of US 26 and OR 35, the Government Camp maintenance station, Bennett Pass, Parkdale, and the junction of OR 216 and US 26. Construction rock would be quarried as needed and used shortly after crushing.

During public and agency scoping for the proposed project, the potential for increased truck and recreation traffic conflicts was identified as a key issue. The amount of material to be removed each year could range from less than 40,000 cubic yards to more than 100,000 cubic yards. Conservative estimates show that quarry operations are expected to generate a total of 8,680 truck trips per year. Hauling could occur from mid-April through the first measurable snowfall (typically in November), except for emergencies. Daily truck traffic at the quarry could peak at

285 trips per day when all three types of hauling (sand stockpiling, general roadway construction, and emergency construction) are being conducted on the same day. Under this worst-case scenario there would be one truck entering or leaving the quarry every two minutes. On a more typical day of operation the quarry would generate only 53 trips per day, or 1 truck trip every 12 minutes. These levels of truck traffic would not have a significant impact on traffic operations along the haul route. ODOT truck traffic on US 26 in the larger Mt. Hood area may decrease as ODOT would not have to haul rock from out-of-area sites.

Except in emergency situations, which are expected to be uncommon, activities would not occur during the winter season, therefore there would be no impacts to winter recreation use in the area.

No noise-generating or hauling activities would occur during weekends (beginning at noon on Fridays) and holidays, when recreation uses peak. Traffic (hauling) conflicts with recreation use would occur on spring, summer, and fall weekdays. ODOT would post signs during hauling to warn recreational drivers of quarry traffic at intersections with the Trillium dam, the day use area access, the campground access, and the turnoff to the airstrip near Summit Meadows. With implementation of these measures, conflicts between truck and recreational traffic would be minimized.

Pedestrians and bicyclists often travel on the haul route, and there is a potential for conflict between those users and motorized vehicles. The FS currently plans to provide a trail along a portion of FS road 2656 to improve pedestrian and bicycle safety (see Chapter 4, Cumulative Effects). Hauling activity on the road could increase safety concerns.

To provide a better trail connection for mountain bikers and continued year-round use of the quarry for recreation, the FS would relocate the Quarry Connector trail around the quarry and maintain it for winter cross-country skiing and summer mountain biking use. The trail would be relocated prior to quarry expansion affecting the trail. ODOT would pay for the planning, design, and construction of the relocated trail. The trail could be designed with input from local mountain bike and back-country ski clubs. The route would be at a grade of less than eight percent with rest grades approximately every 200 feet to accommodate mountain bikers in the summer use season. It would be suitable for grooming with a snow groomer. Quarry operations would maintain the designed location and grade of the route into the future.

As noted in Section 3.4.1, bicycles and pedestrian traffic as well as motorized vehicles use the road. The narrow roadway and limited sight distance, combined with the mix of recreation traffic and large trucks (accessing the quarry) would increase safety concerns on the haul route.

3.4.2.2 Alternative 2

Although ODOT expects to extract less rock under Alternative 2 as Alternative 1, rock would be extracted and processed as needed under either alternative, and the annual number of truck trips would be similar under both Action Alternatives. Therefore, the impacts of Alternative 2 would be similar to those of Alternative 1.

3.4.2.3 No Action Alternative

Under the No Action Alternative, the FS would continue to use the quarry occasionally for rock extraction operations.. Since ODOT's contractor would have to haul rock from out-of-area sites, implementation of the No Action Alternative would result in trucks traveling more miles on US 26 in the Mt. Hood area than under one of the Action Alternatives.

Because the quarry would be expanded to existing permitted boundaries, the No Action Alternative would affect the Quarry Connector trail. The trail would be relocated, as described for Alternative 1.

3.4.3 Mitigation Measures

Levels of truck traffic expected to be generated by either Action Alternative would not have a detrimental impact on traffic operations along the haul route. Therefore, no mitigation measures for motor vehicle traffic would be required. Quarry operations (including hauling) typically would not occur during weekends and holidays; ODOT would implement traffic control measures to minimize traffic conflicts. These project design features would minimize traffic conflicts in the area. However, to mitigate potential safety issues between pedestrians/bicyclists and additional truck traffic, the following mitigation measure would be implemented.

1. ODOT would contribute $30,000 toward development of a pedestrian/bicycle trail along the haul route from Government Camp to Trillium Lake. The FS plans to develop the trail as part of a separate action, as described in Chapter 4 (Cumulative Effects).

3.5 RECREATION

3.5.1 Existing Conditions

The Trillium Lake area is one of the most popular recreation sites on the Forest (Pelles-Madrid, pers. comm., 2003). Summer is the busiest season, but the area is used year-round. The typical spring/summer/fall season runs between April 15 and November 15, with peak use during Memorial Day weekend and between June 15 and September 7. Primary access is via FS road 2656. A Forest Order requires that the road be closed to motorized vehicles when the gates are closed. (The gate is approximately 50 feet south of US 26.) The gates are generally closed by November 25 (depending on snow levels) and left closed until April 15. In high snow years, they are closed earlier; in low snow years they are closed later. The FS typically opens the gates or allows plowing of the road, if requested by owners of private property in the Forest or the campground concessionaire (1000 Trails), after April 15.

The Trillium Lake Campground is approximately 1.5 miles from Tamarack Quarry, on the eastern shore of Trillium Lake. The campground contains 57 campsites with water, restrooms, and a boat launch. No motors are allowed on the lake. Figures supplied by the campground concessionaire show that an average of 10,000 people camp at the campground each year (Walker, 2003). The concessionaire reports that in 2002 there were 17,078 campers (Norman, pers. comm., 2003b). The campground is open and reservations are required from May 22

through September 2. Dispersed camping is available north of Trillium Lake at the intersection of Trillium Lake Road with Summit Meadows Road.

The Trillium Lake day use areas also are used heavily. The campground concessionaire estimates that at least 5,330 vehicles and 12,000 people visit the Trillium Lake day use areas annually during the fee season (Walker, 2003). The concessionaire reports 15,836 users in 2002 (Norman, pers. comm., 2003b).

The two-mile-long Trillium Lake Loop Trail #761 is open May through October and is rated "easy." It loops around the lake with opportunities to view wildlife. Boardwalks take visitors through alpine wetlands (FS, 2003b). The $5 day use fee or a Northwest Forest Pass is required if visitors use the parking area. Only hiking is permitted (no horseback riding, mountain biking, or trailbikes). As of June 3, 2003, the trail is maintained and cleared of logs (FS, 2003c).

Winter trails (all roads covered with snow) in the area include the Trillium Lake Loop, the Mud Creek Loop, the Lost Man Connector, and the Quarry Connector. The Quarry Connector goes through the project area along the south and east sides. Quarry work in recent years has reduced the trail so that it is too steep for beginning-level cross-country (Nordic) skiers and mountain bikers (Walker, 2003). The quarry is open for recreational use except during operations.

The typical winter season runs between November 15 and April 15 and averages 10,000 users over that time period. Winter use is primarily on weekends and holidays (e.g., Thanksgiving and Christmas to New Year's Day). Activities that occur during the winter months are cross-country skiing and snowshoeing, among others. The Trillium sno-park is a parking area on the south side of US 26, accessed by FS road 2656. The Trillium sno-park is often full on weekends between December 15 and March 31, with 200 cars or more (Walker, 2003).

Hunting is regulated by the Oregon Department of Fish and Wildlife (ODFW). ODFW collects data by telephone surveys of a sample of tag holders. The project area is in Western Oregon, Cascades Area, Santiam Unit. The unit includes a large area of the northern Cascades, including portions of both the Mt. Hood and Willamette National Forests. The north boundary of the unit is the Columbia River; the south boundary is US 20. On the east the unit is bounded by the Multnomah and Clackamas county lines, OR 35, the Warm Springs Indian Reservation, and the Linn County/Jefferson County line. On the west, the unit boundary follows Highway 226, Highway 213, Cascade Highway, and OR 226 (ODFW, 1996). Although the area around Mt. Hood is an accessible and popular area for deer and elk hunting, in general there has been a slow but steady decline in hunting over the past 20 years (Hurtado, pers. comm., 2004). For the 2000 archery and rifle deer season (the most recent data available), ODFW reports 17,670 hunters hunted 116,816 hunter-days (average 6 days per hunter) in the Santiam Unit (ODFW, 2004). The rifle deer season typically lasts three weeks to a month during the month of October. Bull elk season in the Cascades is one week during October, during which hunting for deer is prohibited (Hurtado, pers. comm. 2004).

The majority of recreation in the Mud Creek drainage occurs between US 26 and the dam on Trillium Lake. FS road 2656 is used for vehicle access to the campgrounds and day use areas as well as pedestrian and bicycle use from Government Camp and nearby campgrounds.

3.5.2 Potential Impacts

3.5.2.1 Alternative 1

There would be no impacts to winter recreation, except if ODOT were to plow the haul route in emergency situations. Based on past experience, winter quarry access would be unlikely to occur, as neither ODOT nor the FS have accessed the quarry during winter months, even for emergency use (Beckman, pers. comm., 2005). The main portion of the Trillium Lake Loop is a popular cross-country ski trail, and winter plowing would displace this activity.

Conflicts with spring, summer and fall recreation use, including traffic conflicts (hauling) and noise conflicts (blasting after July 15, crushing, screening, batching, and hauling) would occur on weekdays. Since recreation data separating weekend from weekday use is not available, impacts to spring, summer, and fall weekday use cannot be quantified. However, noise from operations would impact weekday recreation. Levels of truck traffic expected to be generated by either Action Alternative would not have a significant impact on traffic operations along the haul route. In addition, in order to minimize traffic conflicts, ODOT would post signs during hauling to warn recreational drivers of quarry traffic at intersections with the Trillium dam, the day use area access, the campground access, and the turnoff to the airstrip near Summit Meadows.

Although quantitative impacts on hunting cannot be assessed since ODFW collects data only for the Santiam Unit as a whole, the Mud Creek area is popular for hunting. Noise from blasting, crushing, and hauling would impact hunting, as these operations would occur in October, during both rifle deer and bull elk seasons.

The quarry would remain open for recreation use except during blasting and hauling operations, therefore there would be no permanent loss of acreage for dispersed recreation. ODOT would post signs closing the quarry to recreation during operations.

Quarry expansion under Alternative 1 would affect the existing Quarry Connector trail. Public and agency comments identified this as a key issue during the scoping process. To provide a better trail connection and continued year-round use of the quarry for recreation, the FS would relocate the Quarry Connector trail around the quarry and maintain it for winter cross-country skiing (suitable for beginner to intermediate skiers) and summer mountain biking use (suitable for intermediate bikers). The trail would be relocated prior to quarry expansion affecting the trail. The trail could be designed with input from local mountain bike and back-country ski clubs. ODOT would pay for the trail relocation. The route would be at a grade of less than eight percent with rest grades approximately every 200 feet to accommodate mountain bikers in the summer use season. It would be suitable for grooming with a snow groomer. Quarry operations would maintain the designed location and grade of the route into the future.

3.5.2.2 Alternative 2

The impacts of Alternative 2 would be similar to those of Alternative 1, described above.

3.5.2.3 No Action Alternative

Under the No Action Alternative, the FS would extract the remaining estimated 750,000 cubic yards of rock in the permitted area. The frequency and duration of noise impacting recreation users, including hunters, is expected to be less than under the Action Alternatives, using the assumption that the FS would extract up to 10,000 cubic yards per year). During periods of quarry use, noise intensity could be equal to that under the Action Alternatives. Trucks would continue to haul material along the haul route. As this occurs under current conditions, no additional impacts would be anticipated.

The Quarry Connector trail would become too dangerous for use under the No Action Alternative. Extracting rock from the remaining seven acres of permitted area would cause dangerous conditions, as the trail runs along the edge of the permitted area boundary. The trail would be relocated as described under Alternative 1, above (Section 3.5.2.1). The Trillium Lake Loop cross-country ski trail would not be impacted by plowing the haul route, except when quarry use is needed for emergency road repairs.

3.5.3 Mitigation Measures

Levels of truck traffic expected to be generated by any of the alternatives would not have a significant impact on traffic operations, and therefore would not cause significant traffic conflicts, along the haul route. As part of the proposed project, quarry activities would be limited to daytime, weekday hours. No truck hauling is to occur when the gates are closed for winter (typically November 25 to April 15) except for emergencies. No additional measures are feasible to mitigate noise impacts on recreation users.

3.6 THREATENED, ENDANGERED AND SENSITIVE WILDLIFE SPECIES

3.6.1 Existing Conditions

The Salmon River watershed provides potential habitat for more than 230 species of wildlife. The watershed also provides special habitats including wetlands, rock outcrops, talus slopes, cliffs and waterfalls (FS, 1995). Vegetation in the watershed was classified into stand structure classes for the Salmon River Watershed Analysis. Structure classifications were based on tree size and canopy closure. Two levels of structural categories were used in this analysis:

- Coarse level split into Open, Small Conifer, and Large Conifer.
- Finer breaks based primarily on canopy closure within these three classes.

Open: Vegetated areas that currently function as openings. These include:

- Grass/forb/shrub (GFS) (including grass/forb/shrub/advanced): Dominated by early seral vegetation and tree seedlings with less than 40 percent total tree canopy cover.

- Open Sapling/Pole (OSP): sapling and pole size trees dominate (less than 9 inches dbh) and canopy cover is 70 percent or less. Shrubs may be well established.

Small Conifer: Stands that have tree canopy closure over 40 percent and are dominated by tree sizes between 9 and 21 inches dbh, or sapling/pole stands over 70 percent closure. These stands include:

- Closed Sapling Pole (CSP): trees up to 9 inches dbh dominate the stand; canopy closure is greater than 70 percent. Early-seral understory vegetation begins to decline .
- Open Small Conifer (OSC): trees 9 to 21 inches dbh dominate the stand; canopy closure is 70 percent or less.
- Closed Small Conifer (CSC): trees 9 to 21 inches dbh dominate the stand; canopy cover is over 70 percent. A range of stands are represented—from dense young single-story stands with little understory vegetation to older stands with multiple layered canopies.

Large Conifer: Stands that have tree canopy closure of 40 percent or more and are dominated by trees greater than 21 inches in diameter. These stands include:

- Open Large Conifer (OLC): trees over 21 inches dbh dominate the stand, and canopy cover is 50 percent or less.
- Closed Large Conifer (CLC): trees over 21 inches dbh dominate the stand and canopy cover is over 50 percent.

Over 50 percent of the expansion area is composed of GFS stands with the remaining 50 percent of the expansion area are in the CSC structure stage. Within the CSC stands remnant late seral Douglas-fir and western hemlock trees occur. A majority of these trees are snags in various states of decay.

3.6.1.1 Threatened and Endangered Species

There are two federally listed threatened wildlife species identified by FS as having the potential to occur within the project area: the northern spotted owl (*Strix occidentalis caurina*) and the bald eagle (*Haliaeetus leucocephalus*). The FS has not identified any federally listed endangered species in the project area.

The northern spotted owl is a federally listed threatened species. Throughout their range and during all seasons, spotted owls consistently concentrate their foraging and roosting in old-growth or mixed-age stands of mature and old-growth trees. A variety of nest structures have been used, but most spotted owl nests on the Mt. Hood National Forest have been found in old-growth stands. The FS has mapped suitable spotted owl nesting, roosting, and foraging (NRF) habitat across the forest based on aerial photograph interpretation. No NRF habitat was identified in the project area on the map and a field reconnaissance of the proposed expansion area confirmed that

the project area does not provide suitable NRF habitat for spotted owls. The project area, at best, serves as dispersal habitat. A historic spotted owl nest site is located over 0.5 mile but within 1.0 mile of the project area in the Mud Creek drainage. The USFWS recently completed a 5-year status review of the northern spotted owl to determine if the species is under any new threats since its original listing as a threatened species in 1990. The study concluded that many factors still exist that affects the viability of the spotted owl populations throughout its range. Although the continued loss of NRF habitat was cited as a continued threat, no information in the status review directly applies to the project area due to the absence of NRF habitat and the unlikelihood of project area becoming NRF habitat in the future due to poor site conditions. A biological assessment was completed to assess the impact to the northern spotted owl. Refer to Appendix D.

Bald eagles, a federally threatened species, are found along the shores of saltwater and freshwater lakes and rivers. They occur throughout the state during the non-breeding season and may occur in the project area during this period. In Oregon, bald eagle nests are generally located within one mile of water (Marshall et al., 2003). Trillium Lake, located over a mile north of the quarry, provides the closest potential habitat. The lake is seasonally stocked with fish but may not provide a consistent prey base for bald eagles. The proposed quarry expansion area does not provide suitable nesting habitat for bald eagles. There are no known bald eagle nests within one mile of the project area (Isaacs and Anthony, 2004). Winter use of the project area is unlikely since bald eagles congregate in areas of abundant forage and low human disturbance. Due to its elevation at 3,601 feet, Trillium Lake may freeze during the winter, limiting forage opportunities. The recreational use within the project vicinity is high, which would further limit bald eagle use of this area.

The Mt. Hood National Forest currently has no mapped Canada lynx habitat. The best available data indicate that the Canada lynx is currently not present on the Forest. Without the presence of lynx and without lynx habitat, consultation under section 7(a)(2) of the ESA would be concluded with a determination of no effect (Dyck, 2003).

3.6.1.2 Sensitive Species

There are 16 wildlife species on the Regional Forester's Sensitive Species List for the Mt. Hood National Forest. Of these 16 wildlife species, California wolverine, Pacific fringe-tailed bat, Pacific fisher, Larch Mountain salamander, and Oregon slender salamander may occur within the project area. Refer to Appendix C for more discussion of these species. Wolverines are known to occur on the Zigzag Ranger District and are believed to prefer secluded areas with minimal disturbance. Due to the level of year round human disturbance within the project vicinity, wolverines are unlikely to remain in the area. However, this species may travel through the Mud Creek catchment. Pacific fringe-tailed bats are typically associated with caves, mines, and buildings but may use snags for day roosts. This species may forage along the roads in the project area. The snags and down wood in the project area could provide habitat for Pacific fisher, Larch Mountain salamander, and Oregon slender salamander.

3.6.1.3 Northwest Forest Plan Species

The *Record of Decision for Amendments to the Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl* (FS and BLM, 1994) provides direction for surveying for survey and manage species. The direction was modified by the 2001 Survey and Manage ROD (FS and BLM, 2001) as described in Section 1.7.2.

Surveys were conducted for terrestrial mollusks and an amphibian that were identified as survey and manage species, but no individuals were found. Although no surveys were conducted for the bats, the remnant old trees within the project area most likely provide roosting and foraging habitat. The surveys were conducted in accordance with the 2001 Survey and Manage ROD.

Refer to Appendix C for more discussion of these species.

3.6.1.4 Management Indicator Species

The following species are classified as management indicator species for the Mt. Hood National Forest: black-tailed deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), marten (*Martes americana*), and pileated woodpecker (*Dryocopus pileatus*). All of these species are most likely present in the project area. The large diameter snags within the project area would provide habitat for the marten and pileated woodpecker. The project area also provides summer thermal cover and foraging habitat for deer and elk. Deer and elk are regulated and managed by ODFW. The project area is within the Santiam Unit and according to their website population levels are stable to increasing for both species within the Santiam management unit. The migration and feeding movements of both species are to the south of the project area and the project area does not appear to be utilized to any large extent as cover or forage. The most recent annual monitoring reports indicate that remote camera and tracking surveys have documented strong presence of both pileated woodpeckers and pine martens and that their populations appear viable (FY02 report page 76, FY03 report page 67). Refer to Appendix C for more discussion of these species.

3.6.2 Potential Impacts

3.6.2.1 Effects Common to Alternative 1 and Alternative 2

3.6.2.1.1 Threatened and Endangered Species

No northern spotted owl NRF habitat would be removed in conjunction with this project. However, there is suitable NRF habitat within one mile of the quarry and 0.25 mile of the haul route. These distances were used to evaluate potential disturbance to nesting spotted owls and is based on the Programmatic Biological Assessment for Activities with the Potential to Disturb Northern Spotted Owls and/or Bald Eagles in the Willamette Province for FY 2002-2003 (BLM and FS, 2002). Since surveys were not conducted for this project, the adjacent NRF habitat is assumed to be occupied for the purposes of determining impacts. Depending on the selected alternative, up to 48 acres of dispersal habitat may be removed to expand the quarry.

The proposed project would generate noise above local ambient levels when the quarry is in operation. The sources of the noise would include blasting, rock crushing, bulldozers or similar type equipment to move rock within the quarry, and load trucks. The duration of these activities would depend on the need for rock over the next 20 years. There are two known ODOT road construction projects on OR 35 scheduled to begin in summer 2005 that would require rock from the quarry. Sanding rock would be needed for the winter of 2005. Noise-generating quarry operations, except blasting, would occur on weekdays (Monday at 7:00 a.m. through Friday at noon, except holidays) from mid-April to the first measurable snowfall (typically in November). ODOT would plow the haul route open in April and May.

Blasting would begin after July 15 to minimize disturbance during the critical nesting period for spotted owls of March 1 to July 15. Although no NRF habitat would be removed, dispersal habitat would be removed, and the blasting could disturb nesting spotted owls after the critical nesting period. Therefore, the determination is that this project **may affect,** but is **not likely to adversely affect** the northern spotted owl.

Neither Alternative 1 nor 2 would have an effect on bald eagles. Neither Action Alternative would remove bald eagle nesting, winter roosting, or foraging habitat. It is assumed that project noise would not impact non-breeding eagles.

3.6.2.1.2 Forest Sensitive Species and survey and manage

Timber removal would occur in the expansion area but the rate of the removal would occur slowly over 20-year period. No specific expansion plans have been developed, as the expansion would occur as needed. The stands within the expansion area are predominantly open canopy, early seral habitats. The removal of these stands and other structural stage classes present in the expansion area comprise less than a one percent reduction of each of these structures within the watershed. For example, 28,069 acres of the watershed are stands classified as closed small conifer structure class. Alternative 1 would remove only seven acres of this stand structure and Alternative 2 would not remove any stands within this stage class. No late seral structural classes occur in the project area.

The expansion area contains mature, remnant (over 21 in dbh) snags and downed logs. The Salmon River Watershed Analysis states that snag density in the watershed is low overall due to past high intensity fires and past management practices (FS, 1995). Snag density is low in the Mud Creek subwatershed, however the subwatersheds adjacent to the expansion area (East and West Forks and Upper Salmon River) have a high density of large snags.

Both Alternatives 1 and 2 would remove snag and large down woody debris habitat in the expansion area that may impact sensitive species such as the Pacific fringe-tailed bat and the Pacific fisher. Higher quality habitat for wolverine and fisher occur in the adjacent East and West Forks subwatershed and in the Mt. Hood Wilderness in general. Potential suitable habitat exists in the expansion area for the Larch Mountain salamander, and Oregon slender salamander. Surveys were conducted for these species to FS protocol, and no individuals were located. The

implementation of either Action Alternative would remove habitat for these species. This loss of habitat is offset by higher quality adjacent habitat outside of the project area and Matrix land allocations. This adjacent habitat in protected wilderness areas and meadow complexes is expected to provide the primary suitable habitat for listed wildlife species.

3.6.2.1.3 Mt. Hood National Forest Plan Management Indicator Species

As discussed above, both Action Alternatives contain habitat (snags and downed wood) for marten and pileated woodpeckers and summer thermal habitat for black-tailed deer and elk. This would be impacted by timber removal; however, in the case of pine marten and pileated woodpecker not only is there suitable adjacent habitat but the LRMP management areas (B5) are retained for this watershed and managed for these species.

Noise from quarry operations may deter or limit deer, elk, marten, and pileated woodpecker use of the surrounding habitat within the project vicinity. The duration and intensity of the noise from crushers and blasting is not expected to disturb species roosting, denning and foraging over 0.25 mile from the quarry. This threshold is documented in a recent USFWS white paper (Livezey 2003) in which noise from heavy equipment, helicopters and blasting are not documented to disturb species present over 120 yards away. Blasting can cause disturbance up to a mile away. For this reason blasting would not occur until after July 15 to minimize disturbance to spotted owls; this would also minimize disturbance to deer and elk calving areas in the riparian areas of Mud Creek. Deer and elk wouldbe rearing young when blasting is set to begin in mid-July but the high quality rearing areas are over a mile away from the quarry and are not expected impacted by project activities.

3.6.2.2 No Action Alternative

In the event that the No Action Alternative is selected, the FS would still continue to operate the quarry under the existing permits. However, prior consultation for these activities has not occurred and informal consultation would need to be initiated prior to the next use of the quarry.

Quarry expansion and associated operations would be limited to the existing permitted boundary, which includes removal of up to seven acres. There would be no modification of NRF habitat but dispersal habitat would be removed. Quarry operations, rock haul, and road maintenance would be the same as the Action Alternatives stated above. Therefore, the No Action Alternative **may affect,** but is **not likely to adversely affect** the northern spotted owl.

The seven acres within the permit boundary do not include the levels of snags and down woody debris habitat found in the rest of the expansion area; therefore, it is not expected that expanding the quarry to the permitted boundary would impact sensitive or management indicator wildlife species.

3.6.3 Mitigation Measures

As part of the project design, blasting would not occur before July 15 to mitigate for potential impacts to northern spotted owls. In addition, all quarry operations would be limited to daylight hours only; mufflers would be on all equipment; a blasting and operation plan would be developed and the reclamation and spill response plan would be implemented. No other mitigation measures are required.

3.7 FISHERIES

3.7.1 Existing Conditions

The Salmon River Watershed contains both anadromous and resident fish species. Distribution of anadromous fish (chinook salmon, coho salmon, steelhead, and sea-run cutthroat trout) is limited to the lower portions of the Salmon River watershed. Lower Columbia River coho, Chinook, and steelhead Evolutionarily Significant Units and their critical habitat have all been listed under the Endangered Species Act. The closest stream to the Tamarack Quarry is Mud Creek, which is approximately 0.4 mile away. There is no hydrologic connection between the project area and Mud Creek. Mud Creek is a tributary to the Salmon River that has a natural anadromous fish barrier approximately 9 miles downstream of Trillium Lake.

Resident cutthroat and rainbow trout inhabit streams in the upper part of the watershed, which contains the project area. Both species are found within Mud Creek and the West Fork Salmon River (FS, 1995). Both are considered to be species of concern and are Mt. Hood National Forest management indicator species.

Habitat requirements for resident rainbow trout are similar to those for steelhead. Mud Creek is within the range of natural variation and within LRMP standards for pools. Most of the Mud Creek catchment has low to moderate large woody debris recruitment potential (in other words, there are not many large trees within approximately 100 feet of the creek). Stream temperatures in the Mud Creek drainage have been recorded as high as 19.3° C (66.7° F), above the threshold for adverse effects on rainbow trout. In 1995, approximately 58 percent of the riparian reserves within the Mud Creek catchment had less than 60 percent canopy closure. For these reasons, habitat in Mud Creek near the project is degraded due to a lack of pools and large woody debris (FS, 1995). Within Mud Creek the lack of large woody debris and relatively high stream temperatures may be attributed to historical harvest (more than 62 percent of the riparian reserves had received some kind of harvest activity). Habitat conditions are expected to improve because of implementation of the Northwest Forest Plan and the Aquatic Conservation Strategy (FS, 1995).

The resident cutthroat population is from native stock, and resident cutthroat are well distributed throughout the Salmon River Watershed. Habitat conditions for cutthroat trout in the Mud Creek Watershed are as described above for rainbow trout. Increased sedimentation in the upper watershed from road sanding activities is of concern because of the potential effects of sediment

deposition on redds (nests). Because sediment loads from road sanding are greatest during spring runoff, sanding has the greatest effect on reproduction of spring-spawning native trout and favors fall-spawning brook trout (FS, 1995).

Competition with brook trout and hybridization with introduced stocks of rainbow trout are also of concern. Brook trout compete for limited habitat and food resources, and prey on the eggs and larvae of other fishes. Rainbow trout releases in Trillium Lake allowed them to spread into Mud Creek, Salmon River and other mainstem tributaries and allows possible hybridization with native rainbow and cutthroat trout. It appears that if the hatchery fish are not harvested quickly they do not survive the following winter (FS, 1995).

Bull trout, a federally listed threatened species, may have historically occurred in the Sandy River Basin and Salmon River sub-basin, but its presence has not been confirmed. Suitable habitat and isolation exists to support this species in the upper Salmon River watershed (FS, 1995). Bull trout presence has also not been confirmed in Mud Creek. This is the closest stream to the Tamarack Quarry and is approximately 0.4 mile away. A natural fish barrier located on the Salmon River, approximately 9 miles downstream of Trillium Lake prevents anadromous fish from accessing Mud Creek.

The only fish species on the Regional Forester's sensitive species list that is suspected to occur in the Salmon River watershed is the interior redband trout (FS, 1995). Its closest potential habitat is over 0.4 mile from the quarry.

No habitat exists for FS sensitive invertebrate or aquatic mollusk species in the project area. The LRMP fish management indicator species for the project area are salmonids, but according to the standards and guidelines (FW-138), impacts on salmonids shall be determined for each project affecting fisheries, in terms of habitat quality, quantity, and distribution (FS, 1990).

3.7.2 Potential Impacts

3.7.2.1 Alternative 1

Based on field investigations, review of literature and data, and conversations with FS staff, the following determinations were made. Since the closest stream is 0.4 mile from the project area, Alternative 1 would have no effect on federally listed threatened bull trout. Alternative 1 would have no effect on any of the ESA-listed fish found the lower reaches of the watershed. Alternative 1 is expected to have no impact on the interior redband trout or anadromous salmonids. Anadromous salmonids cannot access the project area because of a natural fish barrier. Alternative 1 would not impact fish habitat quality, quantity or distribution, and would not affect Essential Fish Habitat.

3.7.2.2 Alternative 2

For the reasons given for the impacts of Alternative 1, Alternative 2 would have no effect on bull trout and no impact on interior redband trout or anadromous salmonids. Alternative 2 would not impact fish habitat quality, quantity, or distribution, or Essential Fish Habitat.

3.7.2.3 No Action Alternative

The No Action Alternative would have no impact or effect on any fish species or Essential Fish Habitat.

3.7.3 Mitigation Measures

No mitigation measures are proposed.

3.8 PLANT COMMUNITIES

3.8.1 Existing Conditions

The "Survey of Rare Vascular and Non-Vascular Plants, Fungi and Lichens for the Tamarack Quarry Proposed Expansion Area" (Salix Associates, 2003) provided the basis for the information on plant communities. FS search protocols were followed for all species and species groups. The Regional Forester's list, the Mt. Hood National Forest list, and the current Northwest Forest Plan survey list were referred to for identifying potential rare plants and fungi.

3.8.1.1 Threatened, Endangered, and Sensitive Species

Salix Associates conducted a survey for listed threatened, endangered, and sensitive (TES) species on July 24, 2003. No TES plants were located within the quarry expansion area.

Habitats encountered in the study area include: dry talus, mesic coniferous forest and moist coniferous forest. These habitats were searched thoroughly for TES species. No conks of noble polyphore were found; however, stumps and snags searched in the area provide suitable habitat. The study area is divided into seven plant communities, described in Table 3-3 and illustrated on Figure 9.

Area B (shown on Figure 9) may provide habitat for Gorman's aster (*Aster gormanii*), which is on the Mt. Hood National Forest list of sensitive plants. One leathery grapefern (*Botrychium multifidum*) was observed in Community E. The area provides potential habitat for *Botrychium* species.

More information on TES plant species is presented in Appendix E.

See Figure 9.

Table 3-3. Vascular Plant Communities in the Tamarack Quarry Study Area

	Community A	**Community B**	**Community C**	**Community D**	**Community E**	**Community F**	**Community G**
	Northwest of quarry area, along Rd 2656-955	**West of quarry area, along Rd 2656-955**	**North of quarry area**	**North of quarry area**	**Northeast portion of study area**	**South of quarry area**	**South of quarry area, along Rd 2656-955**
Character	Gentle west slope	Moderate west-southwest talus slope with scattered conifer cover	North-northwest undisturbed talus slope	Scattered large, old-growth conifers over a moderately dense intermediate layer of young conifers	Flat with small moist depressions	South aspect, mostly unforested, undisturbed dry talus, low plant diversity	Dry, second-growth conifer forest with scattered large old stumps
Tree Layer	Douglas-fir, western hemlock; and some silver fir, western white pine, western red cedar	Douglas-fir, western white pine, western hemlock		Old-growth dominants: Douglas-fir, western hemlock, western red cedar; intermediate layer dominants: western hemlock, silver fir	Old-growth, large snags, and dead-topped western red cedar, western hemlock		Douglas-fir, silver fir, western hemlock, some western white pine
Shrub Layer	Dense—Pacific rhododendron, vine maple, Alaska blueberry	Sparse—dwarf oceanspray,		Dense—Pacific rhododendron		Dwarf oceanspray	Pacific rhododendron, snowbrush, golden chinkapin
Herb Layer	Sparse	Sparse—penstemon, beargrass		Sparse—beargrass, alpine wintergreen	False bugbane, triangle-leaf groundsel, dwarf bramble, marsh marigold, lady fern, green false hellebore, stream violet, dwarf bramble, and bunchberry	Penstemon, very few small populations of Cascade parsley fern	Patchy beargrass

Source: Salix Associates, 2003

3.8.1.2 Northwest Forest Plan Species

The *Record of Decision for Amendments to the Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl* (FS and BLM, 1994) provides direction for surveying for survey and manage species. The direction was modified by the 2001 Survey and Manage ROD (FS and BLM, 2001) as described in Section 1.7.2.

Surveys for Northwest Forest Plan (survey and manage) species were conducted on July 24 and August 5, 2003 in accordance with the 2001 Survey and manage ROD. No survey and manage vascular plant, bryophyte, lichen, or fungus species were found during the surveys.

The bryophyte community is moderately developed and is dominated by terrestrial species. Commonly encountered bryophytes include: *Rhytidiopsis robusta*, *Dicranella varis*, *Dicranum* spp., and *Racomitrium* spp. Talus areas exhibited the highest levels of species richness. The lichen community also is only moderately developed and dominated by alecteriod (pendulous) and green-algal foliose taxa. In the study area, frequently encountered taxa include: *Alectoria sarmentosa*, *Bryoria* spp., *Hypogymnia* spp., and *Platismatia* spp. Cyano-lichens (nitrogen-fixing) are poorly represented and restricted to infrequently encountered thalli of terrestrial species in talus areas.

3.8.1.3 Noxious Weeds

Noxious weed surveys were conducted beginning at US 26 at the north end of the haul route, and along both sides of FS road 2656 and FS road 2656-955 into the quarry, for a total of a little more than three miles. Numerous locations of several noxious weed species were found and mapped along the haul route and in the quarry. These include Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), Scot's broom (*Cytisus scoparius*), foxglove (*Digitalis purpurea*), St. John's wort (*Hypericum perforatum*), birdsfoot trefoil (*Lotus corniculatus*), and reed canarygrass (*Phalaris arundinacea*). The locations of these are shown on Figures 10 and 11.

3.8.2 Potential Impacts

3.8.2.1 Alternative 1

Alternative 1 would be unlikely to impact any survey and manage plants, bryophytes, lichens, or other fungi as none were found in the area. Alternative 1 would remove vegetation in the identified plant communities as operations occur in the quarry expansion area. In addition, Alternative 1 would remove vegetation from the area surveyed as plant community E, which contains potential habitat for *Botrychium* species.

Additional discussion of potential impacts is in Appendix E.

3.8.2.2 Alternative 2

Impacts would be similar to those under Alternative 1, although Alternative 2 could be designed to avoid expanding the quarry into plant community E and therefore avoid effects to the potential habitat for *Botrychium* species.

3.8.2.3 No Action Alternative

There would be no impacts to plants, fungi, or lichens under the No Action Alternative, except from the potential spread of noxious weeds. The existing noxious weeds in the quarry area would not be removed. However, any use of the quarry by the FS, ODOT, or their contractors would require noxious weed mitigation prior to entering the quarry.

3.8.3 Mitigation Measures

Under Alternative 1, no measures are possible to mitigate the removal of vegetation in plant community E, which contains potential habitat for *Botrychium* species. Under Alternative 2 and the No Action Alternative, no impacts to plant communities are anticipated; therefore no mitigation measures would be required.

The following measures would be implemented to minimize the potential for the spread of noxious weeds.

1. Prior to project implementation, all identified noxious weeds within the quarry should be removed. This includes pulling, bagging in plastic bags, and burying all noxious weeds including St. Johns wort and bull thistle. Scot's broom can be pulled or cut at the main stem at ground level. Scot's broom does not need bagging, only burying. If burying can be accomplished in the soil disposal area soon after bagging or cutting, all cut or bagged vegetation may be buried at the site.

2. A FS botanist would survey the quarry annually for noxious weeds and would draft a report as to the findings. (Alternatively, a qualified botanist would conduct a survey and prepare a report for review and approval by a FS botanist.) Additional weed control (bagging, cutting, burying) would be done annually if justified by the botanist's report.

3. Heavy equipment brought to the quarry from off the Forest should be free of soil clumps and vegetative matter or other debris that could contain seeds prior to entering the Forest.

4. Should material from outside the Mt. Hood National Forest boundaries be imported to the quarry, a FS botanist would be consulted prior to the material being transported to ensure noxious weeds are not imported to the quarry.

5. To protect from erosion, all exposed soil areas would be seeded, mulched, and fertilized by September 30 of each year where the area is disturbed. Grass species used would comply with the Mt. Hood National Forest policy on the use of native plants and be certified free of Oregon and All States noxious weeds. Mulch would be applied to the entire seeded area and to consist of straw from fields that grow State-Certified grass seed (which is certified free of

See Figure 10.

See Figure 11.

Oregon noxious weeds) or other sources determined to be free of noxious weeds. Mulch species preferably would be from native seed sources, annual rye, or cereal grain fields. Mulch should be applied at a rate of 3,000 pounds per acre.

3.9 SOILS AND GEOLOGY

3.9.1 Existing Conditions

The project area lies within the High Cascade Physiographic Province described by Franklin and Dyrness (1969). Locally, landforms where the project area is located, such as Mud Creek Ridge, the Mud Creek valley, and Summit Meadows, are typical of features associated with the High Cascade Province. Mud Creek Ridge is typified by rolling mountainous terrain of modest elevation (less than 5,000 feet). Its side slopes are moderately steep to steep, and primarily uniform (or in places concave) in shape. The valley of Mud Creek is U-shaped, and along with Summit Meadows is about one-quarter to one-half mile wide. Valley relief is primarily gentle and slopes are mild. The quarry site is located on the south side of an east-west oriented spur ridge that projects westward from the much larger north-south oriented Mud Creek Ridge. These ridges form the east valley wall of Mud Creek Valley. Both Mud Creek Ridge and the spur ridge are composed of andesite. This material originated as lava flows from ancient volcanoes that predate the present Mt. Hood volcano. The andesite material is approximately one to two million years old.

The haul route leads from the quarry down to the valley bottom, then past Summit Meadows and up to the base of Mt. Hood at US 26. Slopes around the quarry site naturally range between about 20 and 50 percent, while those directly at the quarry range from nearly level to very steep, in places being nearly vertical. In comparison, slopes crossed by the haul route usually do not exceed 30 percent.

The first recorded use of the quarry was in 1957, when 40,000 cubic yards were removed for a project on US 26. Excavation began on the south side of the spur ridge, probably because there were extensive rock outcrops and talus rock exposed there. Early excavations occurred at what is now the lower quarry level. Over the years the height of the quarry backslope increased until sometime in the 1970s when a bench or upper level was started. This reduced the height of the lower level backslope and allowed for safer quarry operations. Since then most of the rock excavation has occurred at the upper level.

Although the rock usage records for the Tamarack Quarry are incomplete, an estimate of the total volume of rock removed was made by estimating the original topography of the spur ridge and comparing that to the present topography. Using that method, the estimated volume of rock removed in 46 years of operation is approximately 450,000 cubic yards. Therefore, the long-term average annual volume of rock removed is about 10,000 cubic yards. Most of the rock removed from the quarry has been used by the FS or ODOT for road projects.

Standard rock quality tests have been conducted periodically since 1957, including surface samples and drill core samples. Rock quality test results indicate consistently good quality rock. A typical result for the LAR test is 18 to 24. Rock from Tamarack Quarry has been used satisfactorily for crushed aggregate, highway sand, riprap, and paving rock. Upland soils around the project area are dominated by moderately deep, gravelly sandy-loams and silt loams that have formed in colluvium of glacial till. The soils exhibit a moderate surface erosion potential, due primarily to slope.

Soil characteristics around the quarry site and along portions of the haul route are similar, but the quarry site itself is underlain directly by igneous rock, and, in places, soils are very shallow or wholly lacking (Howes, 1979). Drilling records indicate that samples collected from several old test borings at the site were andesite, and that there were no noteworthy groundwater-sources encountered (Deroo, pers. comm., 2003).

Several soil types are associated with valley bottom settings around the project area. Most tend to be either well drained or somewhat poorly drained. There are also wet meadow soils and poorly drained forested bottom lands that occur along the haul route, mainly between Trillium Lake and Summit Meadows. These soils have a high water detention potential and exhibit a low surface erosion potential. Wet soil types are considered sensitive to ground-disturbing activities (Howes, 1979).

The natural erosion regime associated with the Mud Creek catchment where the project is located is primarily related to periodic disturbance. It is probable that the highest rates of naturally occurring erosion were temporarily provoked when a disturbance such as intense wildfire caused bare soil to be exposed to erosive forces. Accelerated rates of surface erosion could have occurred for a time afterward until a protective cover of vegetation was reestablished. Most prone would have been upland soil types on moderately steep to steep slopes, which exhibit a moderate to high surface erosion potential when they are bare and devoid of cover. Under natural conditions, areas in the vicinity of the quarry site and haul route were not generally subjected to intense rates of surface erosion or large quantities of sediment production.

Human disturbance, however, has exposed surface soils to erosive forces in the project vicinity. The Salmon River Watershed Analysis (FS, 1995) indicates that this is attributed mostly to the presence of roads, and estimates that road-related sediment delivered to water bodies in the Mud Creek catchment could potentially amount to 160 tons annually. Of particular concern are road segments composed of dirt or gravel surfacing. In the Mud Creek catchment, the greatest potential for road-generated sediment to be delivered to a water body is where gravel and dirt roads cross over streams – for example, where FS road 2656-903 crosses Mud Creek, which is one-quarter mile west of the quarry site (FS, 1995). Because the haul route is paved with asphalt, sediment generated from the road is very slight when compared to that which is potentially produced from roads with dirt or gravel surfacing.

Road sanding during winter months can be another potential source of sediment delivery to streams. US 26 is the nearest road to the Mud Creek catchment that is sanded. However, because

there are no above-ground flow routes that directly connect the highway with water bodies in the Mud Creek catchment there is little potential for sanding materials to be delivered from the highway to any of the water bodies near to the haul route or quarry site. The haul route is closed in winter and is not sanded.

Areas in the catchment where timber harvest activities occurred in the past are considered to contribute less sediment than roads (FS, 1995). Currently there are no harvest operations occurring in the catchment, and all of the areas that have been previously logged are young plantations where a protective ground cover has established. Except for the remaining roads, any adverse impacts related to accelerated rates of erosion caused by timber harvest activities are diminishing.

At the quarry site, signs of accelerated surface erosion are evident. Unconsolidated sand and fine soil material is scattered loosely throughout the site, or has been arranged into piles and berms for storage. In places, some of the fine fraction materials have been mobilized and transported via concentrated runoff from water bars and hardened driving surfaces to a broad, shallow headwater swale on the south side of the quarry site. Some efforts have been undertaken in the past, with limited success, to control erosion at the quarry site. Currently, erosion control structures at the site are in relatively poor condition and marginally effective, presumably due to vandalism, off road vehicle use, the seasonal snowpack, and infrequent maintenance.

Sediment deposited to the swale from the quarry site does not appear to have undergone considerable transport farther downhill. The majority of spring runoff in the broad swale appears to be subsurface flow, as there are only several places where signs of water at the surface are apparent and there is no continuous channel extending downhill. Thus, the current potential for the sediment deposited in the swale to be transported to a perennial water body such as Mud Creek, one-quarter mile downhill, is very low. The sediment deposits, however, have been encroaching upon a seep located in the bottom of the broad swale about 250 feet from the south edge of the lower pit of the quarry site, a condition that could be judged as inconsistent with standard and guideline FW-084 in the Mt. Hood National Forest LRMP.

More detailed information about soils and erosion is presented in the Soil and Water Resources Technical Memorandum, in Appendix B of this document.

3.9.2 Pertinent Agency Directives

The Salmon River Watershed Analysis (FS, 1995) identifies land use allocations within the Mud Creek catchment designated by the LRMP (FS, 1990) and the Northwest Forest Plan (FS and BLM, 1994). Those that apply to the project area include B2 Scenic Viewshed and C1 Timber Emphasis. Standards and guidelines associated with these designations direct strategic and project-level planning, as well as land uses within their bounds. In addition to these directives, others to be considered in context of the activities and operations proposed in this FEIS include those listed as forest-wide standards and guidelines in the LRMP for soil.

Forest-wide standards and guidelines to be considered in relation to the proposed activities include those for minimizing or preventing undesirable impacts to soil that could result from the use of the transportation system (haul route) and the activities for expanding the quarry site. Those for consideration that most apply to the proposed activities include the following standards and guidelines (paraphrased):

- FW-025/026 Achieving effective ground cover
- FW-027 Removal and sale of topsoil
- FW-059 Implementation of individual best management practices
- FW-060 Preventing the degradation of water quality and natural drainage
- FW-066 Cumulative effects analysis
- FW-075/076 Protection from chemical and hazardous materials
- FW-416 Design standards for proposed road reconstruction
- FW-422/423/424 Minimizing impacts to soil and water resources
- FW-427 Minimizing disturbance to natural drainage patterns

3.9.3 Potential Impacts

A qualitative method was used to analyze the effects of the proposed alternatives. The haul route is not proposed to change beyond existing conditions, and in-depth and detailed analysis would probably not reveal distinct, measurable differences between the alternatives.

Standard practices and procedures for analyzing particular impacts to soil and water resources were considered as an approach for identifying simple cause-and-effect relationships between proposed activities and the natural conditions and physical characteristics of the project area. Cause-and-effect relationships were considered in the context of standard procedures defined in the US Environmental Protection Agency's (EPA) publication, *An Approach to Water Resources Evaluation of Non-Point Silvicultural Sources (A Procedural Handbook)* (EPA and FS, 1980). The primary items considered for concluding effects were the footprint areas of ground-disturbing activities. Secondary items included activities not considered ground-disturbing.

A reclamation plan has been developed for the Action Alternatives. Although excavation and reclamation would occur in stages, the following discussion describes impacts as if reclamation would not be done until rock removal has been completed for the entire project area, presenting a worst-case scenario.

More discussion of potential impacts is contained in Appendix B.

3.9.3.1 Effects Common to All Alternatives

The haul route and its footprint would be the same for all of the alternatives (Action and No Action). No ground-disturbing activities are proposed; hence, no additional impacts are predicted to occur to soil resources underlying the haul route as a direct or indirect consequence of its physical presence and location. Existing effects to soil resources are attributable to current uses and would not be expected to increase or decrease for any of the alternatives.

3.9.3.2 Effects Common to Action Alternatives 1 and 2

The haul route crosses a number of streams. However, because the haul route is paved throughout the area where there are stream crossings, sediment generated from the haul route would be light.

Under Alternatives 1 and 2, there would be an increase above the No Action Alternative in the amount of traffic using the haul route, attributable to periodic intensive hauling. Since the haul route crosses a number of small stream channels, there is greater potential for a portion of haul-related sediment to enter water. Despite these factors, the increase in the amount of related sediment that could be available to enter streams is expected to be slight.

Under both Alternatives 1 and 2, a reclamation plan has been developed and approved by the FS and would be implemented and updated throughout the course of operations and expansion. The excavation plans developed under the Action Alternatives would contain standard operating procedures to prevent accelerated erosion and contain sediment. Since activities proposed in the Action Alternatives are expected to occur more often than those which currently occur under the existing DOGAMI permit (No Action), it is expected that activities prescribed by excavation and reclamation plans would also occur more regularly.

3.9.3.3 Alternative 1

Implementation of Alternative 1 would remove more than two million cubic yards of rock material from the quarry area.

As a direct consequence of implementing Alternative 1, adverse impacts to soil resources could be expected over the greatest amount of area in relation to Alternative 2 and the No Action Alternative. The maximum limits of the quarry site proposed for Alternative 1 provide a footprint size of approximately 70 acres. Proposed expansion of the quarry site to that size could be expected to result in ground-disturbing activities occurring across 48 acres in addition to the existing 22-acre site.

As a result of expansion, the soil mantle and forest cover would be removed from most of the quarry area. Activities and use at the quarry, including the use of heavy equipment, machinery, and vehicles, would increase over existing conditions, causing further ground disturbance that could be expected to render driving surfaces across much of the site heavily compacted. Expansion and operations at the quarry site could result in three-fold increase in the amount of area exposed and heavily compacted.

The potential for sediment transport off site is very high with Alternative 1. Fully expanded, the 70-acre quarry site would mostly be bare and void of a vegetative cover. Exposed soil, sand, and fine aggregate materials at the site could be subject to erosive forces from wet season rains and spring snowmelt, and concentrated runoff could accumulate from large compacted and hardened surfaces. Of the alternatives under consideration, this alternative would expose the greatest area to erosive forces and would create the largest amount of hardened surfaces, thereby increasing the potential for accelerated surface erosion and sediment delivery offsite. However, sediment would not reach Mud Creek or other perennial streams. This alternative could result in the need for a substantially greater effort to minimize elevated rates of erosion and to contain levels of sediment to levels similar to the existing condition.

Removal of the soil mantle, in conjunction with an enlargement of compacted surfaces, would relate to a loss of inherent long-term site productivity over the 70-acre expanded quarry site, equal to a three-fold increase in the amount of affected area. Soil conditions would be severely diminished, making the site incapable of supporting forest vegetation for several decades. Conversion of the site to a non-productive status would add 48 acres to the amount of area currently in a non-productive condition (i.e., existing road segments) in the project vicinity and Mud Creek catchment.

The conditions described for this alternative could be expected to continue as long as the quarry site persists. Reclamation could eventually restore some of the area to a productive status, but the productive capacity could be expected to remain below natural levels across the 70-acre site over the long term.

Although the above discussion describes conditions as if reclamation would not occur until material has been removed from the entire expansion area, it is expected that reclamation would occur in stages, and that the entire 70-acre site would not be exposed at one time. This would partially mitigate impacts to soils.

3.9.3.4 Alternative 2

Under Alternative 2, it is estimated that up to two million cubic yards of rock material would be removed from the quarry.

As a direct consequence of implementing Alternative 2, adverse impacts to soil resources could be expected to be somewhat greater than the No Action Alternative, but less than Alternative 1. The maximum limits of the quarry site proposed for Alternative 2 would have a footprint size of approximately 50 acres. Proposed expansion of the quarry to that size would result in ground-disturbing activities occurring across 28 acres in addition to the existing 22-acre quarry.

As a result of expansion, the soil mantle and forest cover would be removed from most of the quarry area. Activities and use at the quarry, including the use of heavy equipment, machinery, and vehicles, would increase over existing conditions, causing further ground disturbance that could be expected to render driving surfaces across much of the site heavily compacted.

Expansion and operations at the quarry could result in an approximately two-fold increase in the amount of area exposed and compacted.

The potential for off-site sediment transport is high under Alternative 2. Fully expanded, the 50-acre quarry site would mostly be bare and without vegetative cover. Any exposed soil, sand, and fine aggregate materials at the site would be subjected to erosive forces from rains and snowmelt, and from concentrated runoff that could accumulate from large compacted and hardened surfaces. Proposed expansion in this alternative would notably increase the total area exposed to erosive forces and enlarge the amount of hardened surfaces appreciably, thereby increasing the potential for accelerated surface erosion and off-site sediment delivery, although sediment would not reach Mud Creek or other perennial streams. This could result in the need for a substantially greater effort to minimize rates of erosion and to contain sediment levels to those similar to the existing condition.

Removal of the soil mantle in conjunction with an enlargement of compacted surfaces would result in a loss of long-term productivity over the 50-acre expanded quarry site, equating to an approximately two-fold increase in the amount of affected area over existing conditions. Soil conditions would be severely diminished, making the site incapable of supporting forest vegetation for many decades. Conversion of the site to a non-productive status would add 28 acres to the amount of area currently in a non-productive condition in the project vicinity and Mud Creek catchment.

The conditions described for this alternative could be expected to continue as long as the quarry site persists. Reclamation could eventually restore some of the area into a productive status, but the productive capacity could be expected to remain below natural levels over the long term across the 50-acre quarry site.

Although the above discussion describes conditions as if reclamation would not occur until material has been removed from the entire expansion area, it is expected that reclamation would occur in stages, and that the entire 50-acre site would not be exposed at one time. This would partially mitigate impacts to soils.

3.9.3.5 No Action Alternative

As a direct consequence of implementing the No Action Alternative, adverse impacts to soil resources would be less than those for Alternatives 1 and 2. The maximum limits of the quarry site proposed for the No Action Alternative would have a footprint size of approximately 29 acres. Proposed expansion of the quarry site to that size could be expected to result in ground-disturbing activities occurring across 7 acres in addition to the existing 22-acre quarry.

As a result of quarry expansion, the soil mantle and forest cover would be removed from most of the quarry area. Activities and use at the quarry could increase somewhat, and would include the use of heavy equipment, machinery, and vehicles, causing some additional ground disturbance, which could render some of the driving surfaces across the expanded portions of the site heavily

compacted. Expansion and operations at the quarry site would increase the amount of area exposed and heavily compacted by approximately one-third.

Currently, the quarry site is exposed and poorly vegetated, and contains a large source of unprotected sediment. Its compacted surfaces are prone to concentrating runoff in the spring or during heavy precipitation events. As evidence, sediment deposits are readily observable in the broad swale immediately south of the project area and can easily be traced directly to the quarry site. Transport of sediment off site from the quarry appears to have been occurring for many seasons, primarily from snowmelt runoff. Expanding the quarry area by 7 acres would increase the amount of available runoff and sediment. The potential for off-site sediment transport would remain moderate to high under the No Action Alternative.

The absence of a soil mantle, in conjunction with the presence of compacted surfaces at the site, would relate to a loss of inherent long-term site productivity over an estimated 29 acres. Expansion of the quarry site could increase the amount of affected area by approximately one-third over the existing condition. Soil conditions at the quarry would remain severely diminished, making the site incapable of supporting forest vegetation for several decades. Conversion of the site to a non-productive status would add 7 acres to the amount of area currently in a non-productive status in the surrounding area.

The conditions described for the No Action Alternative could be expected to persist at the quarry site for the long term. Reclamation would not occur until extraction of rock materials is complete. Moreover, although reclamation would be aimed at minimizing surface erosion, it would not be expected to fully restore the site to a productive, vegetative status. The return of forest vegetation would take decades. Current practices to reduce elevated rates of erosion and contain levels of sediment under the No Action Alternative would continue to be minimal. Existing erosion control structures are only marginally functional. Despite their presence, it is evident that sediment generated from quarry surfaces has moved off site, particularly on the south side of the quarry.

3.9.4 Mitigation Measures

Under both of the Action Alternatives, a reclamation plan has been developed and approved by the FS and would be implemented and updated throughout the course of operations and expansion. At the minimum these would identify measures for annual erosion and runoff control, and sediment containment, including the following provisions.

1. Place and arrange stock piled soil, rock, or waste materials away from drainage and runoff pathways.

2. Prior to ceasing operations each year (i.e., before heavy snow closes the haul route), for the entire length of FS road 2656-955, as well as the first 0.1-mile segment of FS road 2656-903, and the intersecting segments of FS road 2656: install appropriately spaced structures to drain and dissipate concentrated runoff from road treads and ditch lines (e.g., culverts, waterbars, dry trenches below cross drain outlets, inboard drainage to ditch lines, check dams, etc.).

3. Place runoff control structures at the southern edge of the quarry site that are resistant to vandalism and off-road vehicle use (e.g., constructed benches, rock check dams and filters, rock containment berms, waterbars, infiltration drains, shallow evaporation basins, etc.).

4. Suspend operations, including haul, during excessively wet and high runoff events as determined by the Forest Service Road Manager.

5. Establish an effective ground cover over reclaimed and stock piled soils, including the use of seasonally rigorous species adapted to the site and capable of rebound from seasonal snowpack (e.g., prolific pioneer species enhanced by disturbance, such as long-stolon sedge and pearly everlasting).

Additionally, specific mitigation measures pertaining to stockpiled soil materials could greatly enhance reclamation efforts at the quarry site. During quarry expansion, removal of the soil mantle would entail scraping it nearly down to underlying rock, then stockpiling it on site for subsequent reclamation purposes. In the process surface and subsurface soil horizons would become mixed, altering several natural physical properties such as structure, porosity, and the distribution and arrangement of organic matter. Soil amendments could greatly enhance altered physical conditions by improving the nutrient status of stockpiled soils. Soil amendments used at the site should be approved by a FS botanist.

To reclaim and restore stockpiled soil materials to their inherent productive capability, measures beyond those typical of standard operating procedures could be necessary. These include not only seasonal applications of special soil amendments to enhance nutrient status and increase the content of organic matter, but also efforts to keep the bulk density of materials within a certain range after they are redistributed. Excessively compacted conditions should be avoided as should excessively loose conditions. In a moist state, soil materials should be somewhat firm, but not overly so.

3.10 HYDROLOGY

3.10.1 Existing Conditions

3.10.1.1 Watersheds and Streams

The project area lies mostly within the 4,394-acre 7th field hydrologic unit identified as the Mud Creek catchment. A much smaller portion of the project area is within the 6th field hydrologic unit identified as the West and East Forks of the Salmon River subwatershed. Both of these hydrologic units are contained within the upper portion of the 73,240-acre 5th field watershed of the Salmon River, a tributary to the Sandy River, which flows into the Columbia River (FS, 1995). The entire length of the Salmon River, from its headwaters to its confluence with the Sandy River, is designated a Wild and Scenic River. The Sandy River is designated Wild and Scenic from its headwaters to the Mt. Hood National Forest boundary.

Two perennial streams are near the project area and haul route: Mud Creek, the only named stream near the project site; and an unnamed stream originating from Summit Meadows. Both are headwater tributaries to the Salmon River. There are also a number of small, unnamed, seasonally flowing, intermittent streams that originate from the west slope of Mud Creek Ridge and are tributary to Mud Creek or Trillium Lake. Most cross beneath the haul route, and one is approximately 250 feet from the southern bounds of the quarry site.

Mud Creek is a small, perennially flowing, second-order stream that issues from Trillium Lake reservoir. Its mid- and upper reaches parallel portions of the haul route. Although both the lake and creek are nearby, they are not directly adjacent to or in contact with either the quarry site or the haul route. The shortest distance between the quarry site and Mud Creek is roughly 0.4 mile.

The unnamed perennial stream originates from Summit Meadows and crosses beneath the haul route near where it intersects with FS road 2656-131, about one-half mile south of US 26. It is associated with an adjacent wetland corridor that connects to a complex of wetlands downstream.

Between the Trillium Lake Campground and the quarry site are about ten very small, first-order ephemeral streams that cross beneath the haul route. In the spring and early summer they are freshets that are dry by mid- to late summer. One of these very small streams is proximate to the quarry site. It originates about 250 feet south of the lower pit of the quarry from a small, seasonally ponded seep in a broad shallow swale. The upper reaches are mostly subsurface flow, interspersed periodically with small, pools and wallows that dry up in the summer. These features are disconnected on the surface, and lack a continuous channel between them. About one-eighth mile downhill, this water source emerges to the surface as a continuous feature just above where it flows beneath FS road 2656. It then flows to Mud Creek in a shallow; 2- to 3-foot-wide, indistinct channel lined with dense forest vegetation and filled with an abundance of downed woody debris.

More information is available in Appendix B.

3.10.1.2 Streamflow and the Hydrologic Regime

The Salmon River Watershed Analysis indicates that average precipitation in the Mud Creek catchment ranges between about 65 and 70 inches annually (FS, 1995). The greatest amount falls in the period between November and January, and the least amount in July and August. During most years a winter snowpack accumulates in the drainage, providing water storage over the winter and supplementing surface flow and groundwater recharge in the spring and summer (FS, 1995).

The hydrologic regime of the upper Salmon River, including the 7th field Mud Creek catchment, is a snow- and rain-dominated system. Flows are usually lowest in the late summer and fall, then they typically increase in late fall and stay steady through the wet winter months until early spring. In spring, flows steadily rise again and peak during periods of high snowmelt, then they gradually diminish in late spring and early summer as the snowpack melts (FS, 1995). The project

area is within the upper range of the transient snow zone, where heavy intense rains can fall on accumulations of snow in the mountains. Such occurrences have resulted in the largest runoff and flood events recorded in the western Cascades (FS, 1995). Where rain-on-snow events periodically occur, both natural and human disturbances can have a considerable effect on peak flows, increasing the susceptibility of a watershed to flood events (Harr et al., 1975).

In western Oregon, natural disturbances capable of denuding the forest canopy over a large area, such as wildfire, have been shown to hasten the timing and accentuate the magnitude of peak flows, particularly those resulting from high precipitation and rain-on-snow events. A portion of the western half of the Mud Creek catchment was burned in the early 1940s, and the forest canopy was mostly destroyed over a large area (FS, 1995). The loss of the forest canopy would have diminished its moderating effects on interception of snow and rainfall, snow accumulation, snow melt, evapotranspiration, and runoff until a protective cover of vegetation returned. For a time, peak flows may have been elevated in Mud Creek as an indirect result of wildfire, leading to excessive stream bank erosion, channel scour, and downcutting. At present, however, effects to Mud Creek from past wildfire seem to have diminished greatly since the a protective forest canopy has returned to the once burned-over areas.

Human disturbance, such as road surfaces and clearcut timber harvest, can adversely affect the timing and magnitude of peak flows (Harr et al., 1975). As with natural disturbances, of particular concern are effects of human disturbance on peak flows generated by high precipitation and rain-on-snow events that can increase flooding potential. While past clearcut timber harvest and historic wildfire have been influences, their effect is thought to be diminishing as forest vegetation and a canopy continue to develop.

All of the streams near the quarry site and haul route can be considered relatively small in length, width, and average discharge. They have a low sediment transport capability, even during flood events. This is primarily attributable to the low gradient and gentle relief of the valley bottom, the attenuating effect of wetlands and Trillium Lake, groundwater storage, and porous upland soils. Therefore, fluvial erosion is not considered to be a primary, naturally occurring, sediment-producing and transport mechanism for the Mud Creek catchment.

3.10.1.3 Water Quality

The single beneficial use listed by DEQ for the Sandy River Basin that applies to water bodies that are in direct contact with the project area is categorized as resident fish and aquatic life. Beneficial uses applicable to other notable water bodies nearby, particularly Trillium Lake include boating, fishing, and water contact recreation (Oregon Administrative Rules, chapter 340-410). There are no streams or stream segments in the Mud Creek catchment and project area included on the DEQ 2002 303(d) list of water quality-impaired water bodies (DEQ, 2003) for the applicable beneficial uses.

While there are no known temperature concerns for streams flowing near the haul route or quarry site, the Salmon River Watershed Analysis (FS, 1995) identifies increased water temperature as a

potential concern for nearby Mud Creek, despite the high-quality sources of cold water from springs and wetlands in the area. Data obtained from continuous monitoring conducted in 2002 and 2003 detected temperatures downstream from Trillium Lake that for several periods during the summer exceeded 64º Fahrenheit, the standard for the 7-day average maximum water temperature established by DEQ for the Sandy River subbasin. The cause was attributed to the capability of the surface area of Trillium Lake to intercept solar radiation, along with stream side shade conditions at the time, and to discharge sun-warmed waters to Mud Creek.

The Salmon River Watershed Analysis (FS, 1995) also noted the potential for fine sediment to be delivered to streams from certain road segments in the Mud Creek catchment. Notable increases of fine sediment can have deleterious effects upon the quality and quantity of aquatic habitat. Low-gradient stream reaches such as those of Mud Creek below Trillium Lake were noted as being susceptible sites where fine sediment could potentially accumulate, causing undesirable effects to the quality of pool habitat. Of particular concern were contributing road segments with gravel or dirt surfaces near a water body. Segments of the haul route cross a number of streams, but since most of the haul route is surfaced with asphalt, the potential for large quantities of sediment to be delivered from its surfaces to streams is low. The potential for sediment to be delivered to a stream from the quarry site is also low, partly due to its distance from the nearest perennial stream, but also because there is no continuous channel nearby that connects surface flow directly with water bodies downstream.

3.10.1.4 Wetlands and Floodplains

Several wetlands in the valley bottom are near the haul route. Although the haul route is somewhat removed from, and not directly adjacent to most of these wetlands, it does cross through a wetland corridor that connects with them near the junction with FS road 2656-131, about one-half mile south of US 26. The haul route also crosses through a number of wet forest bottomlands between Trillium Lake Campground and the quarry site. There are no wetlands directly adjacent to the quarry site.

There are no jurisdictional, 100-year floodplains recognized by the Federal Emergency Management Agency or US Army Corps of Engineers in the project area.

3.10.1.5 Aquatic Conservation Strategy

A component of the Northwest Forest Plan, the Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The ACS objectives are a fundamental part of the Northwest Forest Plan and apply to FS-administered lands within the range of the northern spotted owl. The purpose of the ACS is to restore and maintain the ecological health of watersheds and aquatic systems on public lands.

The March 2004 *Record of Decision Amending Resource Management Plans for Seven Bureau of Land Management Districts and Resource Management Plans for Nineteen National Forests within the Range of the Northern Spotted Owl* (March 2004 ROD) (FS and BLM, 2004b) clarified

the intent of the ACS. According to the March 2004 ROD, the ACS objectives are not intended to be applied or achieved at the site-specific (project) scale or in the short term. They are intended to be applied and achieved at the 5th-field and larger watershed scales, and over a period of decades or longer. Based on the direction of the March 2004 ROD, an analysis of the ACS objectives for this project is not required.

3.10.2 Potential Impacts

Following is a discussion of potential impacts from the alternatives under consideration. See Appendix B for more detailed discussion.

3.10.2.1 Effects Common to All Alternatives

3.10.2.1.1 Hydrology, Streamflow, and Channels

Expansion of the quarry site for all alternatives can be considered a created opening. The removal of forest vegetation can effectively reduce interception and transpiration and increase snow accumulation, thereby increasing the amount of net precipitation available for runoff. These effects can alter the hydrograph and have been shown to hasten the timing and accentuate the magnitude of peak flows, particularly those resulting from high precipitation and rain-on-snow events (Harr et al., 1975).

Likewise, expansion as well as operations at the quarry site would create heavily compacted and hardened surfaces, where the capability for infiltration and water transmissivity into underlying materials is greatly diminished, which would also increase the amount of precipitation available for runoff.

As an indirect result, elevated peak flows resulting from created openings and hardened surfaces can lead to excessive stream bank erosion, channel scour, and downcutting. For small watersheds in the western Cascades within the transient snow zone, such as the Mud Creek catchment, effects of created openings begin to become pronounced when the amount of area consisting of a well developed, hydrologically mature forest canopy (represented here as forest stands older than about 15 to 30 years of age), is decreased by about 20 percent (Bosch and Hewlett, 1982; FS, 1990). The extent that hydrologic conditions are altered depends upon the amount of area in a hydrologically immature status.

The primary difference between the alternatives is the comparative size of the opening that would be created as a result of the quarry expansion, and the expanded size and extent of hardened surfaces. There are no proposed improvements, upgrades, reconstruction, or other actions associated with the haul route that would necessitate ground-disturbing activities; hence, no additional impacts to streams or channels are anticipated from the haul route.

Under each of the alternatives, the closest water body to the quarry site would be the small, seasonally wet seep located roughly 250 feet to the south in a broad swale.

3.10.2.1.2 Water Quality

Heavy equipment and machinery that would be used in quarry and haul activities require the use of a variety of petroleum-based fluids such as fuel, oil, and hydraulic fluid. These fluids would primarily be stored within the reservoirs and tanks of individual equipment and machinery, as well as in the tanks of service trucks. During operations, there would always be a possibility for accidents or breakdowns to potentially result in excessive leaks or spills.

Along the haul route, there would be some potential for a spill to enter a water body. If a spill were to occur, its potential to affect a water body would depend on its proximity and deliverable distance to it. The potential would be greatest during times when haul traffic is the highest. During most of the year, however, traffic would be low or non-existent, so the potential would be negligible. At the quarry site the potential for a spill to enter a water body and adversely effect water quality would be low, too, because the nearest source is a small seasonal seep about 250 feet to the south of the project area, and it has no continuous channel that connects to a tributary downstream.

3.10.2.1.3 Wetlands

None of the alternatives propose ground-disturbing activates within or near known wetlands. No direct impacts to wetlands are anticipated as a result of quarry expansion and operations. Wetlands in the catchment are located primarily in the valley bottom, and are far removed from the quarry site. There are no known pathways, such as roads or streams that directly link the quarry site to wetlands. Existing effects to wetlands are attributable to current uses, and would not be expected to increase or decrease for any of the alternatives.

Along the haul route, there would be some potential for a spill to enter a wetland. If a spill were to occur, the potential for it to affect a wetland would depend on its proximity and deliverable distance to it. The potential would be greatest during times when haul traffic is the highest. During most of the year, however, traffic would be low or non-existent, so the potential would be low.

3.10.2.2 Effects Common to Action Alternatives 1 and 2

3.10.2.2.1 Hydrology, Streamflow, and Channels

The size of the created opening that would result from expansion of the quarry site in Alternatives 1 and 2 would be 70 and 50 acres, respectively. Created openings of this size in a small forested watershed are considered rather large. In the western Cascades, openings of this size would tend to receive appreciably more rainfall because there would be very little loss due to interception by a forest canopy. An accumulation of a snowpack notably deeper than that of surrounding forested areas could be expected. In the spring, snow that had accumulated in the opening could melt earlier and faster than normal. Hardened surfaces at the site would limit the amount of precipitation and snowmelt that could infiltrate into the ground. Combined, these factors could cause a noticeable increase in available runoff from the quarry site.

If a substantial proportion of the available runoff were directed off-site toward the broad swale south of the project area, then a notable increase could occur in the amount of water that is normally contributed to its contributing area. As an indirect result, what would normally be subsurface interflow in the swale could become surface flow during periods of high antecedent soil moisture. Recurrence of such conditions over the span of numerous seasons might induce channel-forming processes. Small connected channel segments could begin to develop, altering the hydrology of the swale and its current capacity to store and retain moisture. Existing seeps and vernal pools would possibly disappear as a consequence, and the ability of the swale to store and retain sediment reversed.

Given the large opening that would result from quarry expansion, there is potential for intercepted precipitation at the quarry site to become stored groundwater available as localized contributions supporting base flow. Localized contributions at the catchment scale, however, would have little effect on base flows, including their magnitude and duration.

The duration of hydrologic effects at the site-specific scale attributable to the large quarry site in Alternatives 1 and 2 might last as long as the presence of the created opening and hardened surfaces persist. If left unmitigated, effects could persist for many decades until a hydrologically mature canopy becomes developed over most of the quarry site and the extent of hardened surfaces is sufficiently reduced.

3.10.2.2.2 Water Quality

Large, open, compacted surfaces located in the western Cascades would be capable of intercepting appreciable amounts of annual precipitation, potentially resulting in a noticeable increase in available runoff from the site. Runoff intercepted by hardened surfaces, such as roads, can be routed toward a water source. Roads, for example, can be links between sediment sources and streams, functioning as direct pathways for sediment to be delivered to water, potentially having an effect on water quality.

The quarry site in Alternatives 1 and 2 would be rather large (70 and 50 acres, respectively), and a considerable portion of its surface would be hardened and heavily compacted. Available runoff originating from its surface during rain events or spring snow melt could be intercepted by the access road (FS road 2656-955). Because the access road is not directly linked to any streams, sediment generated from the quarry site would not be routed to a stream. There is no known direct or indirect link via road surfaces between the quarry site and Mud Creek so there is little potential for quarry-generated sediment to adversely affect the water quality of Mud Creek.

Because Alternatives 1 and 2 could have more periods of intense haul using heavy trucks, there is a somewhat higher potential for these alternatives to generate sediment from traffic use beyond that generated by the No Action Alternative. However, the amount of generated sediment that might be delivered to streams and adversely affect water quality, is expected to be slight because intense haul would occur only intermittently during non-winter months throughout the course of the permit, and would not be expected to be prolonged over a long time frame.

3.10.2.2.3 Wetlands

Because Alternatives 1 and 2 could have more periods of intense haul using heavy trucks, there is a somewhat higher potential for the Action Alternatives to generate sediment from traffic use than would be generated by the No Action Alternative. However, the amount of generated sediment that could be delivered to a wetland would be slight because intense haul would occur only intermittently during non-winter months throughout the course of the permit, and would not be expected to be prolonged over a long time frame.

3.10.2.3 Alternative 1

3.10.2.3.1 Hydrology, Streamflow, and Channels

As a direct consequence of implementing Alternative 1, a non-forest patch of approximately 70 acres in size would be created due to quarry expansion, a 48-acre increase above the size of the existing quarry. The opening would comprise about 1.6 percent of Mud Creek's total catchment area. Additionally, ground-disturbing activities associated with quarry expansion and operations could be expected to expand the amount of heavily compacted surface area at the site by nearly three times its current size.

The maximum opening size expected as a result of quarry expansion under Alternative 1 would decrease the amount of area in a hydrologically mature condition in the Mud Creek catchment by about 1.1 percent. The potential effect of a created opening of this size upon the hydrograph is considered to be low at the catchment scale (7^{th} field hydrologic unit). Considering the slightly elevated peak flow estimates for the existing condition, and the moderately small percentage of the catchment converted to an opening in this alternative, the potential for notable alterations to the magnitude, timing, and duration of peak flows attributable to quarry expansion would be low and likely undetectable. Hence, the potential for undesirable channel effects such as excessive channel scour and bank erosion to Mud Creek, including its lower sensitive reaches, is expected to be low.

At the site-specific scale, hydrologic effects resulting from this alternative could be noticeable, as discussed above under Section 3.10.2.2, Effects Common to Alternatives 1 and 2.

3.10.2.4 Alternative 2

3.10.2.4.1 Hydrology, Streamflow, and Channels

As a direct consequence of implementing Alternative 2, a non-forest patch at least 50 acres in size would be created due to quarry expansion, a 28-acre increase above the size of the existing site. The opening would comprise about 1.1 percent of Mud Creek's total catchment area. Additionally, ground-disturbing activities associated with quarry expansion and operations could be expected to expand the amount of heavily compacted surface area at the site by approximately two times its current size.

The maximum opening size expected as a result of quarry expansion under Alternative 2 would decrease the amount of area in a hydrologically mature condition in the Mud Creek catchment by approximately 0.6 percent. The potential effect of a created opening of this size upon the hydrograph is considered to be low at the catchment scale. Considering the slightly elevated peak flow estimates for the existing condition, and the somewhat small percentage of the catchment converted to an opening in this alternative, the potential for notable alterations to the magnitude, timing, and duration of peak flows attributable to quarry expansion would be low and undetectable. Thus, the potential for undesirable channel effects such as excessive channel scour and bank erosion to Mud Creek, including its lower sensitive reaches is expected to be minimal.

At the site-specific scale, hydrologic effects resulting from this alternative could be noticeable, as discussed above under Section 3.10.2.2, Effects Common to Alternatives 1 and 2.

3.10.2.5 No Action Alternative

3.10.2.5.1 Hydrology, Streamflow, and Channels

As a direct consequence of the No Action Alternative, a non-forest patch at least 29 acres in size would be created due to quarry expansion, a 7-acre increase above the size of the existing site. The opening would comprise about 0.6 percent of Mud Creek's total catchment area. Additionally, ground-disturbing activities associated with quarry expansion and operations could be expected to expand the amount of heavily compacted surface area at the site by approximately one-third.

The maximum opening size expected as a result of quarry expansion under the No Action Alternative would decrease the amount of area in a hydrologically mature condition in the Mud Creek catchment by less than 0.2 percent. The potential effect of a created opening of such small size upon the hydrograph and peak flows is considered to be negligible at the catchment scale. Thus, undesirable effects such as excessive channel scour and bank erosion to Mud Creek, including its lower sensitive reaches would not be expected.

At the site-specific scale, the created opening at the quarry site would tend to accumulate a deeper-than-normal snowpack. In the spring, the snow covering the exposed opening could melt earlier and faster than areas under the shade of a forest canopy. Hardened surfaces at the site would limit the amount of snow melt that could infiltrate into the ground. Combined, these factors would cause an increase in available runoff from the quarry site. However, since there are no continuous surface flow-routes directly connecting the quarry site with a stream, noticeable effects to channels resulting from elevated runoff would not be expected. Instead, available runoff would infiltrate into the ground soon after leaving the quarry site.

The duration of hydrologic effects at the site-specific scale attributable to the quarry site could be expected to last as long as the presence of the created opening and hardened surfaces persists. Although overall hydrologic effects are considered slight compared to Alternatives 1 and 2, they would remain until a hydrologically mature canopy becomes developed over most of the quarry site, and the area of hardened surfaces sufficiently reduced. At the catchment scale, the effects

attributable to the quarry site, which are considered to be negligible, would diminish even further over time. As re-growth in clearcut areas continued to develop, the amount of hydrologically mature stands would increase in the catchment (assuming no future, widespread clear cut harvest).

3.10.2.5.2 Water Quality

The Salmon River Watershed Analysis (FS, 1995) indicated a distinct potential for fine sediment to be delivered to streams from certain road segments in the Mud Creek catchment. Contributing road segments of particular concern were those with gravel or dirt surfaces near to, or crossing, a water body. Because the haul route is surfaced with asphalt, its tread is not prone to generate sediment. Despite several short segments of the haul route where there are small bare-cut banks and ditch lines, the potential for plentiful quantities of sediment to be produced and delivered to a water body from its surfaces and adversely affect water quality is very low.

In general, traffic levels expected under the No Action Alternative would be relatively low, including times when material haul from the quarry site would occur. Under the No Action Alternative, the potential for sediment from the quarry site to be delivered to a stream and adversely impact water quality is also low, primarily because no water body is directly connected to the quarry site. The nearest water body is a small, seasonally wet seep about 250 feet south of the project area, and it does not have a continuous channel directly connected with tributaries, or ultimately to Mud Creek downstream.

3.10.3 Mitigation Measures

3.10.3.1 Hydrology, Streamflow, and Channels

Under both of the Action Alternatives, a reclamation plan has been developed and approved by the FS and would be implemented and updated throughout the course of operations and expansion. At the minimum these would identify measures for yearly runoff and sediment control, including the placement of runoff control structures at the quarry site that are resistant to vandalism and off road vehicle use (e.g., rock check dams, retention berms, drainage ditch lines, waterbars, infiltration drains, and shallow evaporation basins). Other mitigation measures would not be required.

3.10.3.2 Water Quality

For all alternatives, excavation and reclamation plans would be developed that would contain provisions for erosion control and sediment containment and would be intended to minimize the effects of project related erosion to water quality (for additional detail regarding prescribed erosion control, see listed items in Section 3.9.4, Mitigation Measures for soils and erosion).

The reclamation plan addresses spill response. A detailed spill response plan would be required for each individual development plan. These plans would include provisions for containment and treatment of fluids in the event of a spill. At the minimum they would require rock filter berms to be located around above-ground storage tanks to contain potential spills, impervious filter

materials beneath storage tanks to prevent petroleum based products from contaminating the site, and supplies of absorbent materials stored on-site or within close proximity to the haul route and quarry so that a certain level of immediate action can occur to prevent fluids from entering water bodies. Plans would primarily address petroleum-based fluids such as fuel, oil, and hydraulic fluid.

Additional mitigation measures would not be required.

3.10.3.3 Wetlands

As noted above, spill plans would be required as a condition of the special use permit and would prevent spills from entering water bodies. Other mitigation measures would not be required.

3.11 WILDERNESS

3.11.1 Existing Conditions

The project area is not within a designated or proposed wilderness area. The Salmon-Huckleberry Wilderness lies approximately 2.5 miles to the west, the Mt. Hood Wilderness lies approximately 5 miles to the north, and the Badger Creek Wilderness is approximately 8 miles to the east. The project area is not within or immediately adjacent to the area that was part of a proposal for a new wilderness area by Senator Wyden in 2004. There have been discussions about a potential proposal for a new wilderness area between members of the Oregon Delegation and the public, but at the present time there are no proposals in Congress. The Salmon-Huckleberry Wilderness is accessible from the Trillium Basin and project area via Sherar Burn Road (FS road 2613). The road leads to Veda Lake, which receives the majority of visitors, and also Kinzel Lake, Devils Peak, and the Dry Fir Trail, all on the north edge of the wilderness. The lake is a dispersed camping area. However, the road is rough, accessible with four-wheel drive vehicles only. Most users (approximately 4,000 per year) access the wilderness via the Salmon River Trail, from FS road 2618 from the north (which accesses the Green Canyon campground). People accessing the wilderness on Kinzel Trail, Dry Fir Trail, and Fir Tree Trail are estimated to be fewer than 100 per year, or approximately 2 percent of the total use (Walker, pers. comm., 2003).

Tamarack Quarry is visible from Sherar Burn Road, on the east side of the Salmon-Huckleberry Wilderness. Because the Sherar Burn (an area burned by wildfire approximately 70 years ago) constitutes the east portion of the wilderness, there are no mature trees to screen the view of the quarry and therefore can impact the users' wilderness experience.

3.11.2 Potential Impacts

3.11.2.1 Alternative 1

Alternative 1 would not directly affect the Salmon-Huckleberry Wilderness or its resources. Since the existing quarry is visible from Sherar Burn Road, the proposed expansion would create more of a visual impact to users' expected wilderness experience on the way to the actual wilderness area. However, only approximately two percent of visitors to the Salmon-Huckleberry Wilderness

use Sherar Burn Road. Therefore the impact is considered to be minor. See also Section 3.3 for a discussion of scenic resources.

There are potential traffic conflicts with recreation users who access the Salmon-Huckleberry Wilderness via FS road 2656 and 2613, although they are expected to be minor, as there are several other accesses to that wilderness area. See also Sections 3.4 and 3.5 for a discussion of traffic conflicts.

3.11.2.2 Alternative 2

The impacts of Alternative 2 would be similar to Alternative 1. However, the visual impact of the quarry expansion would be less than Alternative 1, as the quarry would be expanded by 20 fewer acres. See Section 3.3 for a discussion of scenic resources.

3.11.2.3 No Action Alternative

The No Action Alternative would have no direct or indirect impacts to any designated or proposed wilderness areas. Quarry expansion of seven acres would have some visual impact, as described in Section 3.3.

3.11.3 Mitigation Measures

As no direct impacts to any designated wilderness areas are anticipated, and the potential visual and traffic conflict impacts to Salmon-Huckleberry Wilderness users are considered to be minor, no mitigation measures are proposed.

3.12 CULTURAL AND HISTORICAL RESOURCES

Archaeological Investigations Northwest, Inc. (AINW) was retained to review previous surveys of the area and documentary records and reports on the history of the Trillium Lake area, as well as to conduct archaeological surveys. The results of the research are presented in a report, "Archaeological Survey of the Proposed Tamarack Quarry Expansion Project" (AINW, 2004), which is on file at the Mt. Hood National Forest headquarters.

3.12.1 Existing Conditions

3.12.1.1 Cultural History

Historically, the Salmon River Watershed has been used by American Indians as a major huckleberry picking area, particularly in the Sherar Burn, Mud Creek, and High Rock areas (FS, 1995). The area was also used seasonally for fishing and hunting. In the mid-to late 1800s, EuroAmericans crossed the watershed on the Barlow Road and Oak Grove wagon roads on their way to the Willamette Valley.

3.12.1.2 Methodology

AINW conducted a cultural resources literature search and pedestrian archaeological survey of the proposed project area. Records from the State Historic Preservation Office (SHPO) were checked to determine if archaeological sites had been recorded or if archaeological surveys had been conducted within the vicinity of the proposed project area. General Land Office (GLO) maps were reviewed to determine if historic-period structures or features were present within the proposed project area. In 1812, Congress created the GLO to survey the US, as mandated by the Land Ordinance of 1785. The 30 Public Lands states, including Oregon, were surveyed using the new rectangular system (partitioned into Township and Range). GLO maps recorded physical features and land claims and serve as historic records. Historical maps and published secondary sources, on file with AINW, were also reviewed.

The National Register of Historic Places (NRHP) is the nation's official list of cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archaeological resources. The National Register is administered by the US Department of the Interior, National Park Service. Eligible properties include both properties formally determined as such by the Secretary of the Interior and all other properties that meet NRHP listing criteria (36 CFR 60.4). A review of the NRHP was conducted to determine if any historic properties are listed for the proposed project area. The results of the NRHP review indicated that there is one historic property, the Barlow Road, listed in the NRHP for the project area vicinity. The segment of the Barlow Road is located approximately two miles northeast of the proposed quarry expansion area.

Fieldwork was conducted on two separate occasions for the proposed quarry expansion project. On June 9, 2003, AINW conducted a pedestrian archaeological survey of approximately 48 acres of the proposed quarry expansion area, not including the 22 acres of the existing quarry. The area was surveyed in 50-foot intervals by walking east-west oriented transects. The southern portion of the project area was surveyed within the proposed expansion area boundaries. In the northern portion, the survey was of a rectangular area, some of which was outside of the proposed expansion area boundaries, to ensure that the entire expansion area was covered. On September 25, 2003, AINW surveyed an additional 20 acres, including 18 acres along the northern and eastern boundaries of the proposed quarry expansion area and approximately 2 acres at the west edge of the existing quarry along FS road 2656-955. The additional area was surveyed in 50-foot intervals by walking east-west and north-south oriented transects.

3.12.1.3 Archaeological Surveys

Several archaeological surveys have been conducted and several archaeological sites have been recorded in the vicinity of the current project area. Eight previous archaeological surveys overlap portions of the project area and haul route (FS road 2656 and FS road 2656-955), and three of the surveys resulted in the discovery of prehistoric or historic-period archaeological resources. Seven of the eight surveys were conducted by the FS for timber sale projects, and one of the surveys was conducted for wildlife habitat improvement (Bibb, 1988; Evans, 1982a, 1982b; Jaqua, 1995,

1997; Marvin, 1986; Thurlkill, no date.; Wildt, 1993). The three surveys that resulted in the discovery of archaeological resources were all timber sales. These projects are summarized below.

An archaeological survey of the Snowshoe Timber Sale near the flanks of Mt. Hood recorded one prehistoric site and three historic-period resources. A total of 664 acres was surveyed. The historic-period resources included a segment of the Pacific Crest Trail that begins at Barlow Pass and heads north towards Timberline Lodge, and two circa 1920s FS metal sheep grazing boundary signs nailed to trees (Bibb, 1988). The prehistoric site (35CL101) is a grove of peeled cedar trees located approximately 3.6 miles northeast of the proposed quarry expansion area.

The Lodge Pole Sale cultural resources survey consisted of the survey of a 6.5-acre area located along FS road 2656, approximately 0.25 mile northeast of the Trillium Lake campground (Evans, 1982a). This survey area is located approximately 1.7 miles northeast of the quarry expansion area. The survey resulted in the discovery of a segment of the Oak Grove and Oregon City Wagon Road (FS site number 669EA36), located approximately 1.5 miles northeast of the proposed quarry expansion area.

A survey of approximately 92 acres within the Pepper Timber Sale discovered two prehistoric archaeological sites (Haynes, 1988). Site 35CL251 is described as a lithic scatter (Jaqua, 1997). The other prehistoric site, listed only as FS number 669073, is described as a rock feature composed of basalt boulders and an associated small depression (Martin, 1997). The rock feature is the closest resource to the current quarry expansion area and is approximately one mile to the east.

Archaeological site OR-CL-20, the Summit Meadows Camp site, is along FS road 2656, 2.2 miles northeast of the proposed quarry expansion area. The Summit Meadows Camp site has served many functions over the years, with the earliest being an American Indian campsite used during trips to gather roots and huckleberries (Jaqua, 1999). The site may also have been used by emigrants traveling on the Barlow Road. This location also served as the Summit Ranger Station, a Civilian Conservation Corps camp, and as a Works Progress Administration camp used by construction crews building Timberline Lodge. The historic Summit Airstrip (FS site number 669-104), which dates to at least 1929, serves as the southwest boundary of the site (Jaqua, 1999).

3.12.1.4 GLO Map

The 1884 GLO map for Township 3 South, Range 8.5 East, shows no Donation Land Claims (DLCs) listed for the area containing the current FS road 2656 and no structures are indicated on the map. The area is labeled as “Oregon National Forest” and two historic-period wagon roads labeled “Mt. Hood and Barlow Wagon Road” and “Oak Grove and Oregon City Wagon Road” extend through Section 25, approximately two miles northeast of the proposed quarry expansion area. Section 36 contains an unnamed trail. Still Creek is also shown on the map. The 1923 GLO map for Township 4 South, Range 8½ East, has no DLCs indicated, but an unnamed trail extends through Sections 1 and 2. The portion of the trail extending through Section 2 is situated in the

approximate location of the current FS road 2656 and appears to follow the current alignment of the road, which is about 500 feet from the western edge of the proposed quarry expansion area.

3.12.1.5 NRHP Resource

The Mt. Hood and Barlow Wagon Road is named for Samuel K. Barlow, the pioneer who established the road through the Cascades to the Willamette Valley in 1845. A section of the Barlow Road crosses FS road 2656 approximately 200 feet east of site OR-CL-20, which is believed to have been used as a camping spot by people traveling the road. The NRHP nomination form for the Barlow Road indicates that the road possesses excellent integrity in this location and that the trace of the road is visible on a roadside cut of the FS road 2656 running south to Trillium Lake (AINW, 2004).

The Oak Grove and Oregon City Wagon Road was established to provide people from the Juniper Flat-Wapinitia area a more direct route to Oregon City. Before this road was opened, travelers had to use the Barlow Road, which required crossing the White River twice and paying Barlow's toll (Musser, no date). Peter Delore is credited with blazing the new route in circa 1869. The route met the Barlow Road at Summit Meadows, south of Government Camp. It is not clear who actually constructed the road, but Grauer (1975:22) stated that a French Canadian built the road to compete with the Barlow Road. A portion of the road is located along FS road 2656 northeast of Trillium Lake (Evans, 1982a), approximately 1.5 miles northeast of the current quarry expansion area.

3.12.1.6 Field Survey

Most of the project area is characterized by steep, heavily vegetated terrain. The northern and eastern portions of the project area are covered with coniferous trees with a thick understory of rhododendron, Oregon grape, and bear grass in some locations. There were some relatively flat areas along the eastern boundary, which also contains remnant mature cedar trees. The cedar trees were examined for evidence of peels, but none were discovered.

The northern portion of the proposed quarry expansion area was the most heavily vegetated and was the most difficult to survey because of the thick rhododendron. Vegetation was not as thick in the southeastern portion of the project area, and the southeastern and northwestern portions of the proposed quarry expansion area appeared to have been logged several years ago. A two-track road leading to the top of the existing quarry is in the southeastern portion of the proposed expansion area. Most of the southeastern portion of the proposed quarry expansion area consisted of steep rocky terrain adjacent to the existing gravel quarry.

Because most of the project area was covered in thick vegetation and forest duff, ground surface visibility varied from approximately zero to five percent, with the only mineral soil visibility coming from areas where vegetation was sparse and in exposed root wads resulting from tree throws. The numerous rock outcrops within the survey area were inspected for evidence of stacked rock features and other cultural material. No prehistoric or historic-period features or

artifacts were found during the pedestrian survey and there was no evidence of potentially important archaeological sites within the proposed quarry expansion area.

3.12.2 Potential Impacts

3.12.2.1 Alternative 1

No evidence of archaeological resources (sites or artifacts) was noted during the two pedestrian surveys of the proposed Tamarack Quarry expansion area. Based on the negative results of the field investigations, it is AINW's professional opinion that the proposed project would have no effect on any prehistoric or historic-period sites or resources. AINW therefore recommends a finding of "no historic properties affected" for the proposed quarry expansion project. As noted above, FS road 2656 was not surveyed because no road improvements are planned at this time. Should improvements to the road become necessary, the road would need to be surveyed to assess possible impacts from construction on cultural resources situated in or near the proposed access road. These resources include site OR-CL-20, and segments of the Oak Grove and Oregon City Wagon Road (FS site number 669EA36) and the Barlow Road. All of these resources are adjacent to or cross FS road 2656.

3.12.2.2 Alternative 2

Based on the negative results of the field investigations, Alternative 2 would have no impact on any archaeological resources.

3.12.2.3 No Action Alternative

Based on the negative results of the field investigations, the No Action Alternative would have no impact on any archaeological resources.

3.12.3 Mitigation Measures

1. Should unanticipated archaeological or historical resources be encountered during expansion of the quarry, all ground-disturbing activity in the vicinity of the find would be halted and the SHPO and FS would be promptly notified to assure compliance with relevant state and federal laws and regulations.

3.13 LAND USE AND PLANNING

3.13.1 Existing Conditions

3.13.1.1 Land Uses

The first recorded entry at Tamarack Quarry was in 1957, when 40,000 cubic yards of rock were removed for use on a US 26 project. The estimated total volume removed from the quarry is 450,000 cubic yards in 46 years of operation. The existing quarry comprises approximately 22 acres. The remainder of the project area is undeveloped forest land.

Trillium Lake Campground is north of the Tamarack Quarry. The main access to the campground is via FS road 2656. Section 3.5 provides more information about the campground and usage.

One hundred and sixty acres of private land lie east of Trillium Lake (T3S, R8½E, Section 35, tax lot 200) and are accessed via Sherar Burn Road (FS road 2613). The road runs through the property. The area south of the road was logged approximately 10 years ago. No residences are on the property.

Other private properties are north of the lake and comprise approximately 60 acres. They can be accessed via FS road 2656 and 2650. One 2.3-acre lot is separate from the others and does not contain a residence. The rest is a group of parcels south of Still Creek Campground—the Summit Meadows subdivision. According to Clackamas County tax assessor records, the subdivision contains 75 tax lots under 34 separate ownerships and 20 residences. At least one of the residences is occupied year-round (Norman, pers. comm., 2003a). The subdivision is approximately 2.5 miles northwest of the quarry.

3.13.1.2 Plans, Policies, and Regulations

3.13.1.2.1 Mt. Hood National Forest LRMP

The project area is within the Mt. Hood National Forest. The Forest wide standards and guidelines of the LRMP (FS, 1990) apply to land in the project area and vicinity. The project area land management allocation designations for the quarry and proposed expansion area are "B2, Scenic Viewshed" and "C1, Timber Emphasis." Forest-wide standards and guidelines that apply to the project area include those related to soil productivity; air quality; water quality; riparian areas; fisheries; forest diversity; threatened, endangered, and sensitive plants and animals; wildlife; forest protection and public safety; timber management; transportation systems/facilities; travel and access; dispersed recreation; visual resource management; cultural resource management; human rights; special uses; minerals management; and special forest products. The management prescription for the Scenic Viewshed management area that applies to the proposed project is B2-047 (H.3.): "All mineral developments shall require a complete development and rehabilitation plan, including restoration and landscaping prior to development." The management prescription for the Timber Emphasis management area that applies to the proposed project is C1-037 (I.): "Minerals exploration and development (i.e. locatable, leasable, and common variety) may occur."

The Tamarack quarry is categorized as "saleable (common variety) minerals." The Forest-wide standards for Minerals Management that pertain to the proposed project are FW-398 to FW-406. Section 3.13.2, Potential Impacts, contains the text of those standards as well as statements about proposed project compliance.

3.13.1.2.2 Northwest Forest Plan

In 1993, President Clinton directed an interagency task force (FEMAT) to identify management alternatives to resolve ongoing disputes about the management of federal forest lands in the range

of the northern spotted owl that would comply with existing laws, take an ecosystem approach to managing for biological diversity, and produce the highest contribution to economic and social well-being. The plan applies to over 24 million acres of public land managed by the FS and BLM, in the Pacific Northwest and northern California, including Mt. Hood National Forest land. The Northwest Forest Plan (FS and BLM, 1994) applies to the project area. The project area is located in the land management designation "Matrix" and is subject to the standards and guidelines of the Northwest Forest Plan. There are no specific standards and guidelines for non-harvest units. The Matrix consists of lands suitable for timber harvest and silvicultural activities, nonforested areas, and forested areas technically unsuitable for timber production. Approximately 4 million acres, or 16 percent of the Northwest Forest Plan land, is in Matrix.

3.13.1.2.3 Statewide Planning Goals

Although the FS, as a federal government agency, is not subject to state land use regulations, it does strive to comply with the intent of such regulations and policies. The foundation of Oregon's program for land use planning is a set of 19 statewide planning goals. The goals express the state's policies on land use and on related topics. Oregon's statewide goals are achieved through local comprehensive planning. State law requires each city and county to adopt a comprehensive plan and the zoning and land-division ordinances needed to put the plan into effect. The local comprehensive plans must be consistent with the statewide planning goals. Plans are reviewed for such consistency by the state's Land Conservation and Development Commission (LCDC) ("acknowledged"). Once acknowledged, a comprehensive plan becomes the controlling document for land use in the area covered by that plan. Most of the statewide goals are accompanied by "guidelines," which are suggestions about how a goal may be applied and are not mandatory. The two statewide goals applicable to the proposed project and project area are Goal 4: Forest Lands and Goal 5: Natural Resources, Scenic and Historic Areas, and Open Spaces.

Goal 4 is "to conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water, and fish and wildlife resources and to provide for recreational opportunities and agriculture" (Oregon Department of Land Conservation and Development, 2000). One of the four allowed uses on forest lands are locationally dependent uses. As the quarry is a locationally dependent use, its operation complies with Goal 4.

Goal 5 requires that local governments adopt programs to protect natural resources and conserve scenic, historic, and open space areas. Mineral and aggregate resources are a resource category that local governments inventory. Planning guideline 6 states that "in conjunction with the inventory of mineral and aggregate resources, sites for removal and processing of such resources should be identified and protected." Implementation guideline 9 states that "areas identified as having non-renewable mineral and aggregate resources should be planned for interim, transitional, and 'second use' utilization as well as for the primary use." Tamarack Quarry is not included in the Clackamas County inventory, most likely because it was not active (material being removed by truck) at the time of the original inventory (Glasgow, pers. comm., 2003).

3.13.1.2.4 Clackamas County

The FS, as a federal government agency, is not subject to procedural requirements associated with obtaining land use permits. The FS would, however, strive to meet or exceed the local comprehensive plan and development ordinance standards and policies. The Clackamas County Comprehensive Plan Mineral and Aggregate Resources goal is to "protect and ensure the appropriate use of mineral and aggregate resources while minimizing effects of mining and processing on surrounding land uses." The Comprehensive Plan inventories mineral and aggregate resource sites, but does not include Tamarack Quarry, as noted above (Clackamas County, 2003a).

The project area is in the Timber District (TBR) designated by Clackamas County (Glasgow, pers. comm., 2003). The proposed project would be considered a conditional use, as defined in Section 406.06 (Fritz, pers. comm., 2003). "B.6. Mining and processing of oil, gas, or other subsurface resources, as defined in ORS Chapter 520 and mining and processing of aggregate and mineral resources as defined in ORS Chapter 517" (Clackamas County, 2003b). The County does have a Mineral and Aggregate Overlay District, which it does not apply to federal land (Fritz, pers. comm., 2003).

3.13.2 Potential Impacts

3.13.2.1 Alternative 1

3.13.2.1.1 Land Uses

Alternative 1 would convert forest land to quarry use. However, the conversion of 41 acres of forest land from the Mt. Hood National Forest would be negligible. It would not have a direct impact on private property or the Trillium Lake recreation area. Potential recreation, traffic, and noise conflicts are discussed in the relevant sections.

3.13.2.1.2 Mt. Hood National Forest LRMP

In compliance with the LRMP management prescription B2-047 (H.3.) for the Scenic Viewshed management area, ODOT would submit a development and rehabilitation plan, and the FS would review and approve the plan prior to ODOT undertaking any operations in the quarry. Alternative 1 would comply with the C1 Timber Emphasis management allocation, as it explicitly allows minerals exploration and development. Alternative 1 would comply with the applicable forest-wide standards for Minerals Management, as follows:

a. *Removal of common variety mineral materials (e.g. sand and gravel) shall be administered on a sale or permit basis in areas where development does not conflict with other resource objectives. Mineral material requests shall be processed in accordance with procedures in 36 CFR 228, subpart C. Proposed mineral material sources shall have a Development Plan, before first entry.* ***FW-398 FW-399 FW-400***

Alternative 1 would comply with this standard because under either Action Alternative, ODOT would prepare a development plan prior to expansion of the quarry.

b. *Use of currently developed common variety mineral material sources shall be given priority over undeveloped sources. Exceptions shall be made when existing sources are unable to economically supply the quality and quantity of material needed or when conflicts with other resource uses are found to be unacceptable.* ***FW-401 FW-402***

Alternative 1 would use and expand the existing Tamarack Quarry, instead of developing a new resource. Therefore Alternative 1 would comply with this standard.

c. *The effect of rock crushing activities on air quality shall be considered. See Forestwide Air Quality Standards and Guidelines.* ***FW-403***

See Section 3.14 for a discussion of air quality.

The Administration of Operations standards are as follows:

1. No significant surface disturbing, locatable or saleable minerals-associated activities shall take place until an Operating Plan has been approved. ***FW-404***

Tamarack Quarry is considered to contain saleable (common variety) minerals. Alternative 1 would comply with this standard because under either Action Alternative, ODOT would prepare an operating plan prior to disturbance. The FS would review, modify if necessary, and approve the operating plan.

2. The Forest shall cooperate with the Bureau of Land Management in analyzing and processing surface use plans of operations for leasable minerals proposals. ***FW-405***

Tamarack Quarry is considered to contain saleable (common variety), not leasable minerals. Therefore this standard does not apply to the proposed project.

3. A Forest Rock Resource Plan shall be maintained as guidance for managing common variety minerals. ***FW-406***

Tamarack Quarry is considered to contain saleable (common variety) minerals. Alternative 1 would comply with the "Mt. Hood National Forest Rock Resource Plan" (FS 1987). The Rock Resource Plan guides the management of rock resources in the forest and establishes required elements and assigns responsibilities for seven types of work activities: master planning, management analysis, development and rehabilitation, operation, stockpile site construction and rehabilitation, stockpile allocation and use, and mineral materials sale and free-use.

3.13.2.1.3 Northwest Forest Plan

Alternative 1 would comply with the Northwest Forest Plan, as rock quarrying activity is permitted on Matrix lands.

3.13.2.1.4 Statewide Planning Goals and Clackamas County

Alternative 1 would not conflict with applicable Oregon Statewide Planning Goals or applicable sections of the Clackamas County Comprehensive Plan and Zoning and Development Ordinance. The project would be consistent with the County criteria for conditional uses (Clackamas County, 2003b).

Alternative 1 would not have any secondary or induced impacts on the Mt. Hood National Forest, since expanded quarry operations would not generate more natural resource extraction activities elsewhere or development other than planned projects. The FS would continue to manage the forest according to the LRMP. Therefore, there would be no induced population, noise, or business growth in the forest.

3.13.2.2 Alternative 2

The impacts of Alternative 2 would be similar as for Alternative 1, however Alternative 2 would convert 21 acres of Matrix land.

3.13.2.3 No Action Alternative

There would be no additional conversion of forest land under the No Action Alternative, and no conflict with land use plans, policies, or regulations.

3.13.3 Mitigation Measures

Land use impacts would not result from any of the alternatives under consideration; therefore no mitigation measures are proposed.

3.14 AIR QUALITY

3.14.1 Existing Conditions

The LRMP forest-wide standards for Air Quality that apply to the proposed project are the following:

B. Management Activities shall comply with all applicable air quality laws and regulations, including the Clean Air Act (1977 and any updates or revisions) and its associated Oregon State Implementation Plan. FW-040

1 Management Activities shall comply with the Oregon State Smoke Management Plan.

2. Federal, State and local regulations for facilities management shall be applied.

3. Appropriate State performance requirements on emitting facilities for permitted activities that could affect air quality, e.g. mineral, oil, gas or other developments, shall be incorporated.

C. Planning

1. *Forest management activities that could permanently degrade air quality shall consider the cumulative effect of Forest and non-Forest activities through the application of the Clean Air Act (1977) and where applicable, the Prevention of Significant Deterioration regulations (contained in the Clean Air Act).*

2. *Major Federal actions shall consider air pollution impacts.*

D. Forest resources in non-Class I airsheds shall be protected from the effects of air pollution based on the guidelines for Class II airsheds (Clean Air Act 1977).

E. Air quality related values within Class I airsheds, e.g. portions of the Mt. Hood Wilderness and all of the Mt. Jefferson Wilderness on the Mt. Hood National Forest, shall be protected from the effects of air pollution.

The "National Strategic Plan for Air Resource Management" (FS, 1994) provides strategies to protect FS lands from air pollution, to manage FS emissions, and to protect visibility in Class I Wilderness Areas.

The Mt. Hood Wilderness is designated as a Class I Area under the Clean Air Act amendments of 1977. National wilderness areas, national parks, and national wildlife refuges in existence at the time the amendment was passed are classified as Class I. All other areas are designated as Class II. (The Salmon-Huckleberry Wilderness is not designated as Class I.)

The FS maintains an air quality station on Mt. Hood to monitor ozone and particulates (FS, 2003a). DEQ also maintains an air quality monitoring site at the top of the Mt. Hood Ski Bowl chairlift on Multorpor Mountain, three miles north of the quarry. The purpose of the two stations is to monitor visibility in the Mt. Hood Wilderness' Class I airshed.

The DEQ site's nephelometer takes air samples and measures their scattering coefficients, which is observed visibility. Measurements are recorded seasonally July 1 through September 15 between 9:00 a.m. and 9:00 p.m. DEQ has not adopted any air quality standards for visibility/light scattering. Impairment is categorized into "perceptible," "moderate," and "heavy." In general, visibility is good, with most impairment in the "perceptible" category. In the nine years of available data (1994 through 2002), the Mt. Hood Wilderness visibility typically has been better than at Crater Lake National Park and comparable to the central Cascades area—the two other visibility impairment monitoring sites in Oregon (DEQ, 2002).

DEQ requires an ACDP for activities that crush more than 5,000 tons per year of crushed rock.

3.14.2 Potential Impacts

3.14.2.1 Alternative 1

Dust from rock extraction, crushing, screening, batching, loading, and hauling would cause localized air quality impacts to the Trillium Lake Campground area. FS road 2656 is paved. It is highly unlikely that exhaust from equipment would cause a plume that would be visible from Timberline Lodge, as typically exhaust plumes do not appear unless there is a large concentration

(more than 20) of heavy vehicles that are idling simultaneously in one location (Moore, M., pers. comm., 2004). ODOT would have less than a half-dozen vehicles operating at any one time. The projected truck traffic volumes resulting from the proposed project would be negligible compared to volumes on US 26. The typical number of trips per day on the haul route is expected to be 53 per day, with a worst-case scenario of 285 per day. In comparison, US 26 ADT east of Government Camp is 7,000 vehicles.

Rock crushing would occur under Alternative 1. Slash piles may be burned as part of timber clearing in the project area. This would create a short-term air quality impact. Slash burning would comply with the Smoke Management Plan. The clearing of trees may lessen the potential for wildfire at the project site.

ODOT would comply with the LRMP Forest-wide standards and guidelines for air quality by obtaining a Simple ACDP from DEQ for rock crushing operations. The permit includes all the testing, monitoring, record keeping, and reporting requirements sufficient to determine compliance with the emissions limits and standards. The Simple ACDP is issued for a period of 5 years.

Title V of the 1990 http://www.epa.gov/air/oaq_caa.htmlFederal Clean Air Act requires each state to develop a comprehensive operating permit program for major industrial sources of air pollution. As defined in the Title V Operating Permit Program, a major source of air emissions has the potential to emit 100 tons of any criteria pollutant or 10 tons of any single hazardous air pollutant or 25 tons of any combination of hazardous air pollutants. The rock quarrying operations at Tamarack Quarry are expected to emit fewer than 100 tons of air pollutants, and would not emit any hazardous air pollutants.

DOGAMI does not regulate air quality. However, if there are complaints about air quality impacts from the implementation of Alternative 1, DOGAMI may require ODOT to implement mitigation measures. The only standard applied is that dust may not exceed a “reasonable” impact (Moore, R., pers. comm., 2003). The extraction, crushing, screening, batching, and loading of rock may create dust.

3.14.2.2 Alternative 2

The impacts of Alternative 2 would be the same as those of Alternative 1. Although the expansion area would be smaller and ODOT would remove only up to 2 million cubic yards of rock under Alternative 2, approximately the same number of vehicles and equipment would operate for the same length of time under both alternatives for each time ODOT would enter the quarry.

3.14.2.3 No Action Alternative

There would be no new air quality impacts under the No Action Alternative. The extraction, crushing, screening, batching, and loading of rock may create dust.

3.14.3 Mitigation Measures

1. If either Action Alternative creates dust that impacts air quality, ODOT would suppress dust by sprinkling with water or implementing other approved treatment. If water is used a legal source from a municipal water system would be obtained prior to project construction. No water would be taken from any streams on National Forest system lands or Trillium Lake.

3.15 NOISE

3.15.1 Existing Conditions

The Mt. Hood Forest Plan does not address noise. DOGAMI does not regulate noise resulting from quarry operations (Moore, R., pers. comm., 2003), and DEQ relies on local governments to enforce its noise regulations.

Mining or processing of rock is exempt from state noise regulations unless it is within one-half mile of a noise sensitive area and either operates at night or more than nine hours during the daytime and seven days per week (Oregon Revised Statutes 467.120). State administrative rules define noise sensitive areas, in part, as those "normally used for sleeping." Therefore the Trillium Lake recreation area and Summit Meadows subdivision are both considered noise sensitive areas. However, the closest part of Trillium Lake is more than 1.5 miles north of the quarry, and Summit Meadows is approximately two miles away. Both sites are farther away than the state one-half mile threshold.

Existing sources of noise in the Trillium Lake area include blasting, crushing, and hauling from current quarry operations and recreation-related noise such as auto traffic, generators, conversation, dogs barking, etc. Peak noise levels along the haul route are estimated to be 80 to 83 dBA, assuming the truck source is 50 feet away from the receptor (person recreating), and the truck is moving at 30 to 40 miles per hour.

3.15.2 Potential Impacts

3.15.2.1 Alternative 1

ODOT would use noise-generating equipment to extract and crush rock at Tamarack Quarry. Peak noise levels would be the same as the existing condition, however, the frequency and duration of noise would increase. The types of equipment in operation would be the same under Alternative 1 as under existing conditions. Truck hauling material would create the primary noise impact to a noise-sensitive area, i.e., Trillium Lake Campground. Peak noise levels from trucks on the haul route would be 80 to 83 dBA at 50 feet from the receptor and at a speed of 30 to 40 miles per hour. On a typical day, ODOT estimates that trucks would make 53 trips. Peak use (worst-case scenario) would be 285 truck trips per day. Blasting would occur only two to three times per year. As part of project design, noise-generating activities would occur only between 7:00 a.m. and 7:00 p.m. on non-holiday weekdays (until noon on Fridays). (See Table 2-1 for days and times when various activities would be permitted.) In addition, noise impacts would be

somewhat minimized by the topography of the Trillium Lake basin—there is a ridge between the quarry and the campground that would serve as a noise barrier.

Quarry operations would be exempt from state noise regulations since no operations would occur at night, and operations would occur only on weekdays. See Section 3.6 for a discussion of noise impacts to the northern spotted owl.

3.15.2.2 Alternative 2

The noise impacts would be similar to those of Alternative 1. The loudness, duration, and frequency of noise generated annually would be similar to Alternative 1, although quarry operations are expected to cease a few years earlier than under Alternative 1.

3.15.2.3 No Action Alternative

Since the type of rock extraction and crushing equipment used under the No Action Alternative would be the same as that used under Alternative 1 or Alternative 2, noise emitted would be similar in terms of loudness and duration. However, operations would probably occur less frequently than under the Action Alternatives.

3.15.3 Mitigation Measures

As part of the proposed project, noise-generating operations would be limited to weekdays, and equipment would be muffled as appropriate. No mitigation measures are proposed.

3.16 ECONOMICS

3.16.1 Existing Conditions

During the emergency repair of OR 35 after the October 2000 Newton Creek and White River flood event, the price for riprap from a local commercial source would have been $18.75 per ton delivered. A recent ODOT estimate to purchase crushed and delivered commercial sanding rock to the stockpile in Government Camp was $16.00 per cubic yard (Barnhart, pers. comm., 2003). Assuming ODOT would use an average of 100,000 cubic yards of material each year, the annual cost of using a private supplier would be approximately $1.6 million. It is estimated that the price to hire a contractor to crush and deliver sanding rock from Tamarack Quarry would be between $8 and $10 per cubic yard, or approximately $800,000 to $1 million assuming an average of 100,000 cubic yards, and assuming that ODOT would solely use Tamarack quarry for its supply of rock.

Currently, ODOT has only one private supplier that it would use as a source (Barnhart, pers. comm., 2003). Jim Turin & Sons Inc. owns and operates the Brightwood quarry on Barlow Trail Road in Zigzag. The rock at the quarry is basalt. It is the nearest commercial quarry to the Mt. Hood area and is approximately 20 miles from Tamarack Quarry. The business owners estimate that approximately less than 5 percent of their rock business is with ODOT, and approximately 20 percent of their asphalt business is with ODOT. The percentage of Jim Turin & Sons' business

with ODOT varies, depending on whether the company is supplying material for a particular project, or only for roadway maintenance (Turin, pers. comm., 2004).

The FS issues mineral permits to the general public to collect small quantities of rock from Tamarack Quarry. In fiscal year 2002, the FS sold 72 mineral permits for the site at $25 each (revenue of $1,800).

3.16.2 Potential Impacts

3.16.2.1 Alternative 1

ODOT's current private supplier in the area, Jim Turin & Sons Inc., could lose up to 20 percent of its current asphalt business and up to 5 percent of its current rock business under Alternative 1. ODOT may still use private suppliers such as Jim Turin & Sons Inc. for construction rock and asphalt, but Tamarack Quarry would be the primary supply of sanding rock. ODOT would save as much as $600,000 to $800,000 per year on roadway projects. ODOT would use Tamarack Quarry until the rock supply in the 70-acre expanded quarry is exhausted, estimated to be more than two million cubic yards, or what ODOT anticipates extracting in 20 years or more.

ODOT cannot sell any rock products produced from the quarry.

The general public would still be allowed to access the quarry and collect small quantities of rock. There would be no impact to the mineral permit sales.

3.16.2.2 Alternative 2

The impacts of Alternative 2 would be similar to those of Alternative 1, except that ODOT expects to extract no more than two million cubic yards of rock. Once the rock supply in the 50-acre quarry is exhausted, ODOT would need to find another material source.

3.16.2.3 No Action Alternative

Under the No Action Alternative, ODOT and the FS would continue to extract rock from the currently permitted area of the quarry. ODOT would continue to use private suppliers as its main source of rock materials. Jim Turin & Sons Inc. would not experience a decrease in its business with ODOT due to increased use of Tamarack Quarry. ODOT likely would spend as much as $600,000 to $800,000 more per year on rock material than under either Action Alternative.

3.16.3 Mitigation Measures

No mitigation measures are proposed.

3.17 ENVIRONMENTAL JUSTICE

Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations of February 11, 1994, requires agencies undertaking federal projects to identify low-income and minority populations, assess whether adverse human

health or environmental impacts would result from each of the alternatives, and address the project's public outreach program in relation to environmental justice issues.

The federal Council on Environmental Quality (CEQ) issued "Environmental Justice: Guidance Under the National Environmental Policy Act" to comply with EO 12898 and Title IV of the Civil Rights Act of 1964 (42 USC 2000d-1). CEQ Guidance states that agencies should determine the composition of minority populations, low-income populations, and American Indian tribes present in the area that may be affected by a proposed action.

3.17.1 Existing Conditions

3.17.1.1 Minorities

Areas of concern in assessing environmental justice impacts are those where either a minority population represents 50 percent or more of the total population or where the percentage of a minority population is meaningfully greater than its representation in the general population or other appropriate unit of geographic analysis. The census tract and block group are shown as the units of geographic analysis, in comparison with Clackamas County as a whole.

The Census Bureau categories reported are for individuals who identify themselves as Black or African American alone, American Indian and Alaska Native alone, Asian alone, Native Hawaiian and other Pacific Islander alone, some other race alone, two or more races, and of Hispanic origin. The number of people in each of the racial groups was combined to calculate the percentage of all minority races. Persons of Hispanic origin are not included in this total, as persons of Hispanic origin may be of any race. Table 3-4 indicates the percentage of minority residents in Clackamas County and project census tract and block group per the 2000 Decennial Census (US Census Bureau, 2000).

Table 3-4. Racial Composition by Area, 2000

Geographic Area	% Black or African American	% Am. Indian and Alaska Native	% Asian	%Native Hawaiian and Other Pacific Islander	% Other Race	% Two or More Races	% All Minority Races[1]	% Hispanic Origin of any race[2]
Clackamas County	0.7	0.7	2.5	0.2	2.3	2.5	8.7	5.0
Census Tract 243.01	0.3	1.5	0.6	0.1	2.2	2.1	6.7	5.6
Block Group 2	0.0	1.4	1.0	0.0	0.0	2.5	4.6	1.0

Source: US Census Bureau, Census 2000 Summary File (SF) 1 100-Percent Data. P7 Race; P11. Hispanic or Latino
[1] Sum of Black or African American alone; American Indian and Alaska Native alone; Asian alone; Native Hawaiian and Other Pacific Islander alone; some other race alone; and two or more races.
[2] Persons of Hispanic origin may be of any race.

The minority population in all of the categories, including all minority races combined, is not above 50 percent in the project block group, census tract, or the county. All categories of minority

populations in the census tract and block group are the same as or lower than the county as a whole except American Indian and Alaska Native and Hispanic origin. However, the percentage of people identifying themselves in these two categories in the census tract and block group is not appreciably different from the county as a whole.

The closest Indian reservation is the Warm Springs Indian Reservation, approximately 6.5 miles southeast of the project area. It belongs to a confederation of the Warm Springs, Wasco, and Paiute Tribes. The treaty of 1855 granted the Confederated Tribes of the Warm Springs the right of "usual and accustomed" gathering of traditional native plants and "special interest" use.

3.17.1.2 Poverty

In determining the poverty status of families and unrelated individuals, the Census Bureau used income earned in the previous 12 months (1999) and based income threshold on family size, presence and number of children, and age. The percentage of the population in the project block group, census tract, and Clackamas County with an income below the federal poverty level is shown in Table 3-5.

Table 3-5. Poverty Status in the Project Area, 1991[1]

Geographic Area	% Below Poverty Level[1]
Clackamas County	6.6%
Census Tract 9912.02	5.9%
Block Group 3	2.8%

Source: US Census Bureau, Census 2000, Summary File 3 (SF3) Sample Data. P87 Poverty Status in 1999 by Age.

[1] Poverty status was determined for all persons except institutionalized persons, persons in group quarters and in college dormitories, and unrelated individuals under 15.

The block group and census tract containing the project area have lower poverty rates than the county as a whole.

3.17.2 Potential Impacts

Impacts are considered significant if they are disproportionately high and adversely affect minority and low-income populations. A disproportionately high and adverse effect is one that is predominantly borne by a minority population and/or a low-income population, or would be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that would be suffered by the non-minority population and/or non-low-income population.

3.17.2.1 Alternative 1

Alternative 1 would not have a disproportionately adverse long-term effect on minority and low-income populations, as the project is not in an area with a proportionately large population of minority or low-income residents. No activities are proposed that would preclude any granted rights of the Confederated Tribes of the Warm Springs.

The project is not likely to generate any temporary or permanent new jobs. Therefore there would be no particular benefit for minorities or low income people in terms of employment. There are hazards and risks associated with working in a quarry with heavy equipment, and driving on narrow roads. These risks do not fall disproportionately on minorities or low income persons, and there are safety practices in place to provide appropriate levels of protection.

Agencies are required to consider whether human health effects, in terms of risks and rates, are significant or above accepted levels. Impacts such as noise and dust would be the same for minority and low income people as for the general population. No significant adverse human health effects have been related to operation. The project would not result in increased exposure of residents to hazardous materials.

3.17.2.2 Alternative 2

The impacts of Alternative 2 would be the same as for Alternative 1.

3.17.2.3 No Action Alternative

The No Action Alternative would have no impacts to minority or low income populations.

3.17.3 Mitigation Measures

The proposed project would result in no disproportionate significant adverse impacts to minority or low-income persons; therefore, no mitigation measures related to Environmental Justice are necessary.

3.17.4 Public Outreach

An important component of EO 12898 is assuring that all portions of the population have a meaningful opportunity to participate in the development of federal projects regardless of race, color, national origin, or income. CEQ guidance states that agencies should acknowledge and seek to overcome linguistic, institutional, geographic, and other barriers to meaningful participation, and should incorporate active outreach to affected groups.

Notice of the proposed action and DEIS were published in the Federal Register and in *Sprouts*. The project was presented at a public open house on December 5, 2002, at the Mt. Hood National Forest Headquarters in Sandy, Oregon, and at a second open house on May 13, 2004, at the Lions Club in Welches, Oregon. Section 1.8 describes public involvement and Section 1.9 lists the key issues raised. The DEIS is posted on the Mt. Hood National Forest website: http://www.fs.fed.us/r6/mthood.

3.18 HUMAN HEALTH AND SAFETY

3.18.1 Existing Conditions

The EPA, DEQ, and Oregon State Fire Marshal website databases were searched to locate any nearby hazardous waste sites. There are no Superfund sites (National Priorities List) within five miles of the project site. The closest sites are in The Dalles and the Hamilton Island Landfill on the Columbia River near Bonneville (EPA, 2003). DEQ records several sites within a five-mile radius of the project location. One is a spill clean-up at a Mobil Oil site where US 26 turns south. There is one contaminated site clean-up on US 26, and there are seven leaking underground storage tanks and four hazardous waste sites in Government Camp (DEQ, no date).

Facilities that possess reportable quantities[2] of hazardous substances[3] must report to the Office of State Fire Marshal. Information on Class A, B, and C explosives, blasting agents, insensitive explosives, poison gases, etiologic materials, and radioactive materials is not provided by individual facility for security reasons. There are 18 sites in the area, mostly in Government Camp (Oregon Office of State Fire Marshal, 2003). These include gas stations, towing

[2] 50 gallons of liquids (e.g., paint), 500 pounds of solids (e.g., fertilizer), 200 cubic feet of gases (e.g., propane); for poisons or explosives: 5 gallons of liquids, 10 pounds of solids, and 20 cubic feet of gases

[3] Any substance that is required to have a Material Safety Data Sheet, any substance or waste produced in a manufacturing process defined as hazardous by DEQ, poisons and explosives, any non-sealed source of radioactive material, any substance designated as hazardous by the Office of State Fire Marshal.

companies, telecommunications facilities, ski facilities, the sanitation facility, and the rural fire protection district. ODOT stores maintenance-related materials in a site along US 26.

There is no known contamination at Tamarack Quarry (Deroo, pers. comm., 2003).

3.18.2 Potential Impacts

3.18.2.1 Alternative 1

Since there are no known contaminants on the project site and no hazardous materials identified within five miles of the site, there would be no impacts under Alternative 1. If ODOT stores reportable quantities of hazardous substances, ODOT would notify the Office of State Fire Marshal, as required.

Heavy equipment and increased human activity at the site could increase the potential for fires starting at the perimeter of the quarry (e.g., from electrical sparks).

3.18.2.2 Alternative 2

The impacts would be the same for Alternative 2 as for Alternative 1.

3.18.2.3 No Action Alternative

There would be no impacts under the No Action Alternative.

3.18.3 Mitigation Measures

No mitigation measures for hazardous substances are proposed.

1. To minimize the potential for fire starting at the site, vegetation near quarry operations would be sprayed with water during the high fire season (e.g., late summer and early fall).

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Chapter 4
Cumulative Effects

Changes between Draft and Final EIS:

Minor corrections, clarifications, and edits were made.

4. CUMULATIVE EFFECTS

Long-term, cumulative effects are those that result from the incremental impact of the proposed federal action when added to other past, present, and reasonably foreseeable future federal, state, or private activities that would occur within the action area. An example of a cumulative effect of particular concern to the FS is soil erosion and stream sedimentation from multiple timber permits and private logging operations in the same watershed. The cumulative effects of an action may be undetectable when viewed in the individual context of direct and even secondary impacts, but can nonetheless add to other disturbances and eventually lead to a measurable environmental change.

For the proposed action, the land unit to consider for cumulative effects to soil and water resources is primarily the Mud Creek catchment, although the next higher level land unit, the Upper Salmon River subwatershed, is also considered. Future and foreseeable actions other than the proposed actions that are scheduled to occur in the Mud Creek catchment include the Salmonberry #5 commercial thinning project, the Timberline Express Ski Lift at the Timberline Ski Area, the Government Camp fuels reduction project, and trail development in accordance with the Government Camp Trails Master Plan for the Mt. Hood area. None of these projects are in the immediate vicinity of the quarry. No other new quarry operations are proposed in the Mt. Hood National Forest. Past activities within the watershed include previous clearcuts, fire, road construction, and recreation development. No significant adverse cumulative effects are expected from the project, including impacts to transportation systems, recreation, and scenic resources. Minor cumulative detrimental impacts to soils, wildlife habitat, transportation systems, recreation, and scenic resources, and negligible impacts to the watershed are expected. Detailed discussion of these resources is provided in Chapter 3 and the appendices to this FEIS.

The FS has awarded and sold the 31-acre Salmonberry #5 timber sale on the northeast border of the Salmon-Huckleberry Wilderness, within the Salmon River Watershed, southwest of Trillium Lake. It is located west of Fir Tree trail (#674) in T4S, R8E, Section 2. The timber sale includes harvesting 1.45 million board feet of timber and repairing four miles of roads. No new roads would be constructed. The FS is unable to utilize nearby clearcuts to grow huckleberries. Therefore this timber sale on the edge of the Wilderness would be used create more potential huckleberry habitat. The auction date for the sale was June 27, 2003.

The FS is preparing an EIS for the Timberline Express proposal. RLK and Company, the owner and operator of the Timberline Ski Area, proposes to install a new chairlift, install additional night lighting, and expand the existing Special Use Permit boundary by 11 acres in order to accommodate the proposed changes. It is estimated that 88 acres would need to be cleared to implement the project. The new chairlift would provide access to terrain within the existing Special Use Permit boundary that currently is not served by chairlifts. The purpose of the project is to increase winter recreation opportunities at Timberline Ski Area, particularly to provide additional terrain that is sheltered from winter storms, to increase intermediate and high skill-level terrain, to increase night skiing terrain, and to use the existing trail system more efficiently. The FS expects to release the DEIS in summer 2004.

The FS has not yet assessed the traffic, air quality, recreation, and other impacts of the proposed new chairlift and Special Use Permit expansion. However, the project is expected to increase the formal terrain from 456 acres to 512 acres, a 12 percent increase, and to double the capacity for night skiing at Timberline Ski Area, from 990 skiers/riders currently, to 1,890 skiers/riders after construction of the proposed project. Since the increase in use would occur only in the winter ski season, and for night use in particular, traffic conflict impacts, air quality impacts, and other impacts are not likely to compound any impacts of the proposed Tamarack Quarry expansion. Quarry activities would not occur during the winter or at night, except in emergency situations.

The FS is planning a fuels reduction project in the Government Camp vicinity. The project would include approximately 50 acres of mid-seral lodgepole pine stand thinning treatments and potentially some treatment to mid-seral Douglas-fir stands as well.

The Action Alternatives would remove up to 48 acres of currently forested land. Timber removal would occur slowly over a 20-year period. No specific expansion plans have been developed as the expansion would occur as needed. The stands within the expansion area are predominantly open-canopy, early-seral stands. The removal of these stands and other structural stage classes present in the expansion area would comprise less than a one percent reduction of each of these structures within the Salmon River watershed. For example, 28,069 acres of the watershed are stands classified as closed small conifer structure class. Alternative 1 would remove only seven acres of this stand structure, and Alternative 2 would not remove any stands within this stage class. No late-seral structural classes occur in the project area. Revegetation would occur in stages.

The expansion area contains mature, remnant (over 21 in dbh) snags and downed logs. Both Alternative 1 and 2 would remove snag and large down woody debris habitat in the expansion area that may impact sensitive species such as the Pacific fringe-tailed bat, Larch Mountain salamander, Oregon slender salamander, woodpeckers, and Pacific fisher. The Salmon River Watershed Analysis states that snag density in the watershed is low overall due to past high intensity fires and past management practices (FS, 1995). Snag density is low in the Mud Creek catchment; however, the subwatersheds adjacent to the expansion area (East and West Forks and Upper Salmon River) have a high density of large snags.

Higher quality habitat for carnivores such as the wolverine and fisher occur in the adjacent East and West Forks subwatershed and in the Mt. Hood Wilderness in general. The loss of habitat for these species is offset by higher quality adjacent habitat outside of the project area and Matrix land allocations. The adjacent habitat in protected wilderness areas and meadow complexes is expected to provide the primary suitable habitat for listed sensitive wildlife species. Therefore timber removal for the quarry expansion, when combined with other projects such as the Salmonberry #5 timber sale and the Timberline Express, do not represent a cumulative reduction of the mid to later seral stands that are critical to wildlife.

The FS is preparing the Government Camp Trails Master Plan for the southern Mt. Hood area. The FS has begun the NEPA process for the Trails Master Plan and an Environmental

Assessment was released for public comment in July 2005. The NEPA document for the plan includes a proposed trail that would parallel the Tamarack Quarry haul route from Government Camp to Trillium Lake. It would be constructed in 2005 to 2008. Expansion and operations at the quarry would not interfere with the construction or use of the proposed trail. The trail could reduce conflicts between vehicular and pedestrian/bicycle traffic along the haul route. Relocation of the Quarry Connector trail, proposed as part of the quarry expansion project, would complement the proposed parallel trail and would improve the recreation trails network in this area of the Mt. Hood National Forest.

Detrimental soil conditions could be expected to increase in the Mud Creek catchment incrementally over time, particularly with repeated harvest entry where ground-based harvest systems would be employed. Impacts would be isolated to harvest units and minimized to the extent possible by implementing best management practices and Northwest Forest Plan standards and guidelines requiring Riparian Reserve buffers that prevent indirect effects to soil and water resources from accelerated erosion. Overall, accelerated erosion and sedimentation resulting from cumulative actions would increase only slightly over the entire area of the Mud Creek catchment.

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Chapter 5
Summary of Unavoidable Adverse Effects

Changes between Draft and Final EIS:

Minor corrections, clarifications, and edits were made.

5 SUMMARY OF UNAVOIDABLE ADVERSE EFFECTS

Unavoidable effects are adverse impacts that are expected to occur despite mitigation or for which there is no feasible mitigation. There would be no unavoidable adverse effects to fisheries, wilderness, historic or archaeological resources or in terms of land use and planning, environmental justice, or site contamination.

Scenic Resources: Under Alternative 1, the quarry expansion would daylight into the knoll and be visible from Timberline Lodge in approximately 10 to 15 years. Even though the quarry expansion area would be partially visible, it would be subordinate to the characteristics of the natural landscape, and would meet the VQO of Partial Retention.

The existing quarry is visible from the Sherar Burn huckleberry and bear grass harvesting area, and the proposed expansion would create more of a visual impact to users' experience. Alternative 2 would have less of an impact than Alternative 1. Due to the lack of trees in the Sherar Burn area and the topography between that area and the quarry, views of the quarry from Sherar Burn could not be screened.

For the same reason, both Action Alternatives would have unavoidable impacts to the visual experience of recreation users going to the Salmon-Huckleberry Wilderness on Sherar Burn Road. However, since only about two percent of wilderness users go that route, the impact is considered to be minor.

Transportation/Access: The narrow roadway and limited sight distance, combined with the mix of recreation traffic and large trucks accessing the quarry would increase safety concerns on the haul route, particularly for pedestrians and bicyclists.

Recreation: Conflicts with winter recreation would occur if ODOT were to plow the haul route in emergency situations before April 15. The main portion of the Trillium Lake Loop is a popular cross-country ski trail and winter plowing would displace this activity. Conflicts with spring, summer and fall recreation use, including traffic conflicts (hauling) and noise conflicts (blasting after July 15, crushing, screening, batching, and hauling) would occur on weekdays. Noise from operations would impact weekday recreation, including rifle deer and bull elk hunting in October.

Threatened, Endangered, and Sensitive Species: Both Action Alternatives would unavoidably remove northern spotted owl dispersal habitat, and snag and down woody debris habitat. The project may affect, but is not likely to adversely affect, the northern spotted owl.

Plant Communities: Both Action Alternatives would remove vegetation in the identified plant communities. In addition, Alternative 1 would remove vegetation from the area surveyed as plant community E, which contains potential habitat for *Botrychium* species. Alternative 2 could be designed to avoid expanding the quarry into this area.

Soils and Geology: The potential for sediment transport off site is very high. However, sediment would not reach Mud Creek or other perennial streams. Removal of the soil mantle, in

conjunction with an enlargement of compacted surfaces, would relate to a loss of inherent long-term site productivity over the expanded quarry site. Soil conditions would be severely diminished, making the site incapable of supporting forest vegetation for several decades. Conversion of the site to a non-productive status would add 28 or 48 acres to the amount of area currently in a non-productive condition (i.e., existing road segments) in the project vicinity and Mud Creek catchment. These unavoidable impacts would be greater under Alternative 1 than Alternative 2.

Hydrology: The size of the created opening that would result from expansion of the quarry site in Alternatives 1 and 2 would be 70 and 50 acres, respectively. Created openings of this size in a small forested watershed are considered rather large. The opening would comprise about 1.6 percent of Mud Creek's total catchment area under Alternative 1 and 1.1 percent under Alternative 2. Additionally, ground-disturbing activities associated with quarry expansion and operations could be expected to expand the amount of heavily compacted surface area at the site by up to three times its current size.

The project could result in a noticeable increase in available runoff from the quarry site. If a substantial proportion of the available runoff were directed off-site toward the broad swale south of the project area, then a notable increase could occur in the amount of water that is normally contributed to its contributing area. Small connected channel segments could begin to develop, altering the hydrology of the swale and its current capacity to store and retain moisture. Existing seeps and vernal pools would possibly disappear as a consequence, and the ability of the swale to store and retain sediment reversed.

Given the large opening that would result from quarry expansion, there is potential for intercepted precipitation at the quarry site to become stored groundwater available as localized contributions supporting base flow. Localized contributions at the catchment scale, however, would have little effect on base flows, including their magnitude and duration.

The duration of hydrologic effects at the site-specific scale attributable to the large quarry site in Alternatives 1 and 2 might last as long as the presence of the created opening and hardened surfaces persist. If left unmitigated, effects could persist for many decades until a hydrologically mature canopy becomes developed over most of the quarry site and the extent of hardened surfaces is sufficiently reduced.

Air Quality: Dust from rock extraction, crushing, screening, batching, loading, and hauling would cause localized air quality impacts to the Trillium Lake Campground area. Slash piles would be burned as part of timber clearing in the project area and cause a short-term air quality impact.`

Noise: Peak noise levels would be the same as the existing condition, however, the frequency and duration of noise would increase. Hauling, the primary noise impact, would generate peak noise levels of 80 to 83 dBA. On a typical day, ODOT estimates that trucks would make 53 trips. Peak use (worst-case scenario) would be 285 truck trips per day.

Economics: ODOT's current private supplier in the area, Jim Turin & Sons Inc., could lose up to 20 percent of its current asphalt business and up to 5 percent of its current rock business. ODOT may still use private suppliers such as Jim Turin & Sons Inc. for construction rock and asphalt, but Tamarack Quarry would be the primary supply of sanding rock.

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Chapter 6

Short-Term Uses Versus Long-Term Productivity

Changes between Draft and Final EIS:

Minor corrections, clarifications, and edits were made.

6. SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic and other requirements of recent and future generations of Americans.

The purpose of the proposed project is to maintain a safe and efficient transportation system for present and future generations. ODOT would use the extracted rock for road and highway maintenance.

The Multiple Use–Sustained Yield Act of 1960 requires the FS to manage National Forest System lands for multiple uses, including timber, recreation, fish and wildlife, range and watershed. Although the Action Alternatives would alter the long-term productivity of the project area by removing a nonrenewable resource, the extraction and use of rock would comply with applicable LRMP standards. In the short term, adverse impacts to soil resources would result in a loss of long-term site productivity. The site would be converted to a non-forest condition. Reclamation efforts would not restore the capability of the entire site to support dense stands of conifers. The natural capability and productivity of the site would be diminished for the long term. Neither alternative would have long-term impacts on timber, wildlife habitat, soils, water, or recreation resources on surrounding land.

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Chapter 7

Irreversible or Irretrievable Commitment of Resources

Changes between Draft and Final EIS:

Minor corrections, clarifications, and edits were made.

7. IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

5 IRREVERSIBLE COMMITMENT OF RESOURCES

Irreversible commitment of resources refers to the use of nonrenewable resources such as minerals and petroleum-based fuels. These include actions that disturb either a nonrenewable resource (e.g. cultural resource or extinction of a species) or a resource that only can be renewed in a period of time greater than 100 years, if ever (e.g. mineral source). Both Action Alternatives would require the commitment of rock material. Under Alternative 1, more than two million cubic yards of rock would be removed from the project area and used for road construction and maintenance. Under Alternative 2, up to two million cubic yards of rock would be removed and used for road projects. The No Action Alternative would also remove rock material from the quarry—approximately 750,000 cubic yards. At this time, Tamarack Quarry is the largest known source of high-quality rock near Mt. Hood. Implementation of any alternative would irreversibly deplete this rock source to some extent.

In addition, both Action Alternatives and the No Action Alternative would require the use of fuel for quarry equipment and hauling trucks.

Expansion of the quarry site would alter the natural topography of areas to the east and north of the existing site. Excavation of rock and stockpiling of soil materials would result in large quantities of materials being removed from the site. Reclamation plans would not intend to restore the site to a near natural condition, but rather would be aimed at minimizing surface erosion and establishing effective ground cover.

6 IRRETRIEVABLE COMMITMENT OF RESOURCES

Irretrievable commitments of resources refer to the permanent reduction in the ability to produce a renewable resource. Irretrievable commitments cause the lost production, harvest, or use of a renewable natural resource, such as timber or rangeland. It is the opportunity that is foregone for one use (e.g. mineral extraction or timber production) on a project site when the area is designated and developed with another use (e.g. housing or recreational facilities). An irretrievable impact can be reversed with a change in management direction.

The selection of either Action Alternative would commit the site and public resources to the quarry use and foreclose other land use opportunities. Since the site is in Matrix land, other potential uses include timber production and recreation. Implementation of either Action Alternative would mean that the site could not be used for timber production, recreation, or any other use. However, the quarry use is permitted on Matrix land, and such use is not in conflict with the LRMP objectives or strategies. Alternative 1 would cause a greater irretrievable commitment of resources, since more acres of timber land (41 acres) would be converted to quarry use than under the implementation of Alternative 2 (21 acres).

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Chapter 8
Consultation and Coordination

Changes between Draft and Final EIS:

(Minor corrections, clarifications, and edits are not included in this list.)

- Added US Environmental Protection Agency

8. CONSULTATION AND COORDINATION

5 CONSULTATION WITH US FISH AND WILDLIFE SERVICE (USFWS)

Consultation was conducted with the USFWS for the northern spotted owl. The Level 1 Team for the Willamette Province has concurred with the effect determination of *may affect, not likely to adversely affect* for the northern spotted owl based on the potential of blasting at the quarry disturbing owls during the breeding season. Representatives from the USFWS and the FS visited the quarry on May 25, 2004 and concurred with the effects analysis in the biological assessment. The USFWS issued a concurrence letter on June 23, 2004 concurring with the effects determination so long as the mitigation measures identified in Section 3.6.3 are implemented.

Based on the Biological Assessment prepared for the project, there is no effect on the bull trout; therefore, consultation is not required for that species.

6 CONSULTATION WITH NATIONAL MARINE FISHERIES SERVICE (NOAA FISHERIES)

No federally listed anadromous fish species or their habitats occur within or near the Tamarack Quarry. A Biological Evaluation determined the proposed action would have no effect on any listed, proposed or sensitive fish species or designated critical habitat. Therefore, consultation with NOAA Fisheries is not necessary.

7 CONSULTATION WITH THE OREGON STATE HISTORIC PRESERVATION OFFICE (SHPO)

The National Historic Preservation Act requires consideration be given to the potential effect of federal undertakings on historic resources. This includes historic and prehistoric cultural resource sites. The guidelines for assessing effects and for consultation are provided in 36 CFR 800. To implement these guidelines, Region 6 of the Forest Service entered an agreement in 1995 with the Oregon SHPO and the Advisory Council on Historic Preservation. In accordance with the agreement, a survey of the project proposed in the Tamarack Quarry area has been conducted. Based on the results of this survey, a "No Effect" determination has been made. The historic and prehistoric sites located within the vicinity would be protected through measures described in Section 3.12 of this FEIS. The FS has an MOU with SHPO that consultation is not required for "no effect" determinations. The Forest Archaeologist has concurred with the determination and therefore consultation with the SHPO is not required.

8 OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

Because ODOT is seeking a special use permit to utilize the Tamarack Quarry for future projects, representatives of both the FS and ODOT have met periodically throughout preparation of the DEIS. Project alternatives were developed in coordination with ODOT. The DEIS, project elements and mitigation measures were reviewed by both agencies.

9 ENVIRONMENTAL PROTECTION AGENCY (EPA)

The development of the reclamation plan was discussed with members from the EPA. The EPA provided guidance on the development of the plan and was provided a draft copy for their review. EPA had only minor comments on the draft plan which were incorporated in the final plan.

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Chapter 9
List of Preparers

Changes between Draft and Final EIS:

(Minor corrections, clarifications, and edits are not included in this list.)

- Added individuals from ODOT and FS who contributed to the FEIS.

9. LIST OF PREPARERS

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Bruce Newhouse, Botanist, Salix Associates LLC. Responsible for Plant Communities. Education: B.S., Environmental Science. Experience: Botany, wildlife habitat, and wetlands inventory and analysis.

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Todd Reinwald, Soil Scientist. Responsible for Soils and Hydrology. Education: B.S., Soil Science. Experience: Watershed analysis, channel design and reconstruction, slope stability, erosion control, watershed restoration, and fluvial geomorphology; more than 15 years experience.

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Chapter 10
Distribution List

Changes between Draft and Final EIS:

(Minor corrections, clarifications, and edits are not included in this list.)

- Added organizations or individuals that commented on the DEIS.

10. DISTRIBUTION LIST

The FEIS or a letter of availability is being sent to the following individuals, groups, and organizations. The list includes federal agencies, American Indian Tribes and Nations, state and local governments, other organizations, and individuals. In addition, the FEIS is available on the internet at: www.fs.fed.us/r6/mthood. Look under "plans and projects" for the document.

5 FEDERAL AGENCIES

Advisory Council on Historic Preservation

Agriculture, US Department of

Forest Service**,** Pacific Northwest Region
National Agricultural Library
APHIS
Natural Resources Conservation service

Commerce, US Department of

National Marine Fisheries Service

Defense, US Department of

US Army Corps of Engineers

Energy, US Department of

Environmental Protection Agency

Environmental Protection Agency (Seattle and Portland)
Federal Activities Filing Section

Federal Aviation Administration

Interior, US Department of the

Office of Environmental Policy and compliance

Northwest Power Planning Council

Transportation, US Department of

Federal Highway Administration
Office of the Maritime Administration

6 AMERICAN INDIAN TRIBES AND NATIONS

Confederated Tribes of the Warm Springs Indian Reservation

7 STATE AGENCIES

Economic and Community Development Department

Environmental Quality, Department of

Fish and Wildlife, Department of

Forestry, Department of

Geology and Mineral Resources, Department of

Governor's Natural Resources Policy Director

Land Conservation and Development, Department of

Parks and Recreation Department

Public Utilities Commission

State Economist

State Lands, Division of

Water Resources Department

8 LOCAL GOVERNMENTS

Clackamas County, Dept of Transportation and development

City of Sandy, Public Works Director

City of Madras, Public Works Director

9 OTHER ORGANIZATIONS/BUSINESSES

Mt. Hood Cross County Ski Club

Jim Turin & Sons Inc.

Oregon Natural Resources Council

BARK

Timberline Lodge Ski Area

10 INDIVIDUALS

David Butt

Wendy Evans

Larry Hubbard

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Chapter 11
References Cited

Changes between Draft and Final EIS:

- References for Isaacs, Deroo, Beckman, and Hay updated.

11. REFERENCES CITED

5 PUBLICATIONS AND DOCUMENTS

Archaeological Investigations Northwest, Inc. 2004 (February 17). "Archaeological Survey of the Proposed Tamarack Quarry Expansion Project, Mt. Hood National Forest, Clackamas County, Oregon." Report No. 1149.

Bibb, Rowan. 1988. *Cultural Resource Inventory of the Snowshoe Timber Sale Project Area*. Report No. 88/09/11. Zigzag Ranger District, Mt. Hood National Forest, Zigzag, Oregon.

Bosch and Hewlett. 1982. A review of catchment experiments to determine the effects of vegetation changes in water yield and evapotranspiration. *Journal of Hydrology 55*:3-23.

Clackamas County. 2003a (Last updated April 22). Clackamas County, Oregon Comprehensive Plan.

_____. 2003b. Zoning and Development Ordinance.

Dyck, Alan R. 2003 (December 3). "Lynx Effects Determination" Technical Memorandum to Wildlife Biologists, Mt. Hood National Forest. File Code 2670, Mt. Hood National Forest.

Evans, Herbert O. Jr. 1982a. *Cultural Resource Inventory of the Lodge Pole Sales #93, #94 & 95*. Report No. 82/09/09. Mt. Hood National Forest, Sandy, Oregon.

_____. 1982b. *Cultural Resource Inventory of the Trill Special Salvage Timber Sale*. Report No. 82/09/08. Mt. Hood National Forest, Sandy, Oregon.

Franklin, J. F. and C.T. Dyrness. 1969. "Vegetation of Oregon and Washington." US Department of Agriculture, Forest Service, Pacific Northwest Range and Experiment Station. Research Paper PNW-80.

Grauer, Jack. 1975. *Mt. Hood: A Complete History*. Jack Grauer, Portland.

Harr, R.D., W.C. Harper, J.T. Drygier, and F.S. Hsieh. 1975. "Changes in storm hydrographs after road building and clearcutting in the Oregon Coast Range." Water Resources Research. 11(3): 436-444.

Haynes, Bruce. 1988. *Cultural Resource Inventory of the Pepper Timber Sale*. Report No. 88/09/07. Zigzag Ranger District, Mt. Hood National Forest, Zigzag, Oregon.

Howes, S. 1979. "Soil Resource Inventory of the Mt. Hood National Forest." USDA Forest Service, Mt. Hood National Forest.

Isaacs, Frank and Robert J. Anthony. 2004. "Bald Eagle Nest Locations and History of Use in Oregon and the Washington Portion of the Columbia River Recovery Zone, 1971 through 2004." Oregon Cooperative Fish and Wildlife Research Unit, Oregon State University, Corvallis, Oregon.

Jaqua, Jeff M. 1995. *Cultural Resource Inventory of the Salmonberry Timber Sale, North Ridge Area*. Report 96-09-15. Zigzag Ranger District, Mt. Hood National Forest, Zigzag, Oregon.

_____. 1997. Site form for 35CL251. On file, State Historic Preservation Office, Salem.

_____. 1999. Site form for OR-CL-20. On file, State Historic Preservation Office, Salem.

Livezey, Kent, US Fish and Wildlife Service, Western Washington Fish and Wildlife Office. 2003. "Estimates of distances at which incidental take of murrelets and spotted owls due to harassment are anticipated from sound-generating, forest-management activities in Olympic National Forest."

Marshall, D.G., M.G., Hunter, and A.L. Contreras (editors). 2003. *Birds of Oregon, a General Reference*. Oregon State University Press, Corvallis, Oregon.

Martin, Kathleen. 1997. Site form for Mud Creek Ridge Rock Feature. Region 6, Site No. 669073. On file, Mt. Hood National Forest, Sandy, Oregon.

Marvin, Ron. 1986. *Cultural Resource Inventory of the Division Timber Sale*. Report No. 87/09/01. Zigzag Ranger District, Mt. Hood National Forest, Zigzag, Oregon.

Musser, Lloyd. No date. Site form for Oak Grove Oregon City Wagon Road. Region 6, Site No. 662EA13. On file, Mt. Hood National Forest, Sandy, Oregon.

Oregon Department of Environmental Quality (DEQ). 2003. Oregon's 2002 Water Quality Status Assessment Report (Section 305(b) Report).

_____. 2002. "2002 Oregon Air Quality Data Summaries."

_____. No date. Oregon DEQ Facility Profiler. Website: http://deq12.deq.state.or.us. Accessed October 6, 2003.

Oregon Department of Fish and Wildlife (ODFW). 2004. 2000 Western Oregon Deer Season Archery and Rifle Harvest. Website: http://www.dfw.state.or.us/ODFWhtml/Wildlife/StatBooks/Table-of-Contents_00htm. Accessed January 14, 2004.

_____ . 1996 (September). Oregon Wildlife Management Unit Map.

Oregon Department of Land Conservation and Development (DLCD). 2000. Oregon's Statewide Planning Goals & Guidelines. Website: http://www.lcd.state.or.us/goalhtml/goals.html.

Oregon Office of State Fire Marshal (Department of State Police). 2003 (Updated monthly). Community Right-to-Know (CR2K) Hazardous Substance Information Search. Website: http://159.121.82.250. Accessed October 6, 2003.

Salix Associates. 2003 (September 15). "Survey of Rare Vascular and Non-Vascular Plants, Fungi and Lichens for the Tamarack Quarry Proposed Expansion Area."

Thurlkill, Keith. No date. *Cultural Resource Inventory of the Division Timber Sale*. Zigzag Ranger District, Mt. Hood National Forest, Zigzag, Oregon.

US Census Bureau. 2000. Census 2000 Summary File 1 (SF1) and Summary File 3 (SF3).

USDA Forest Service (FS). 1974. *National Forest Landscape Management*, Volume 2, Chapter 1: The Visual Management System, Agriculture Handbook 462.

_____, Mt. Hood and Willamette National Forests. 1982. "Plant Association and Management Guide for the Pacific Silver Fir Zone."

_____, Mt. Hood National Forest. 1987 (April). "Mt. Hood National Forest Rock Resource Plan."

_____, Mt. Hood National Forest. 1990. *Land and Resource Management Plan for the Mt. Hood National Forest.*

_____, Mt. Hood National Forest. 1990a. *Final Environmental Impact Statement for the Land and Resource Management Plan, Mt. Hood National Forest.*

_____. 1994 (December). "National Strategic Plan for Air Resource Management."

_____, Mt. Hood National Forest. 1995. "Salmon River Watershed Analysis." US Forest Service, Mt. Hood National Forest, US Department of Agriculture, Sandy, OR.

_____. 2003a (Last updated November 12). National Air Resource Management Program. Air Quality Images. Website: http://www.fsvisimages.com.

_____, Mt. Hood National Forest. 2003b (Last updated June 5; Accessed August 20, 2003). "Mt. Hood Day Hikes." Website: http://www.fs.fed.us/r6/mthood/recreation2003/day-hiking/zigzag-rd.shtml.

_____, Mt. Hood National Forest. 2003c (Last updated August 8; Accessed August 20, 2003). Recreation Information 2003—Trail Report for Zigzag Ranger District. Website: http://www.fs.fed.us/r6/mthood/recreation2003/trails/zigzag-ranger-district.shtml.

USDA Forest Service and USDI Bureau of Land Management (FS and BLM). 1994 (April). "Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl. Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest related Species within the Range of the Northern Spotted Owl."

_____. 2001 (January). "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines.

_____. 2004a (March). "Record of Decision to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl."

_____. 2004b (March). "Record of Decision Amending Resource Management Plans for Seven Bureau of Land Management Districts and Land and Resource Management Plans for Nineteen National Forests Within the Range of the Northern Spotted Owl."

USDI Bureau of Land Management and USDA Forest Service (BLM and FS). 2002. "The Willamette Providence Fiscal Year 2002 Habitat Modification Programmatic Biological Assessment for Effects to Listed Species."

US Environmental Protection Agency. 2003 (October 3 last updated). Superfund. Website: http://www.epa.gov/superfund/ sites/locate/index.htm. Accessed October 3, 2003.

US Environmental Protection Agency and USDA Forest Service (EPA and FS). 1980. *An Approach to Water Resources Evaluation of Non-point Sources-Silviculture*. EPA-IGA-D6-0660. Washington, DC. As cited in USDA Forest Service, Mt. Hood National Forest, "Salmon River Watershed Analysis," 1995.

Walker, Kathleen, Recreation Assistant, Zigzag Ranger District, US Forest Service, Mt. Hood National Forest. 2003 (January 27). Memorandum to Jim Tierney, Engineering, US Forest Service, Mt. Hood National Forest.

Wildt, Chris. 1993. *Cultural Resource Inventory of the Mud Creek Pot Holes Development*. Report No. 94/09/01. Hood River District, Mt. Hood National Forest, Mt. Hood-Parkdale, Oregon.

6 PERSONAL COMMUNICATIONS

Barnhart, William, District Manager, Oregon Department of Transportation. Electronic mail. June 19 and 24, 2003, and May 25, 2004.

Beckman, Patrick Sr., Maintenance Supervisor, Oregon Department of Transportation. Telephone conversation. September 16, 2005.

Deroo, Tom, Forest Geologist, US Forest Service, Mt. Hood National Forest. Spring 2003, Summer 2005.

Fritz, Greg, Planner, Clackamas County Department of Transportation and Development. Telephone conversation. September 3, 2003.

Glasgow, Clay, Planner, Clackamas County Department of Transportation and Development. Telephone conversation. September 3, 2003.

Hay, Steven, Geology Specialist Oregon Department of Transportation. Electronic mail. December 15, 2004.

Hurtado, Joel, Biologist, Oregon Department of Fish and Wildlife. Telephone conversation. January 14, 2004.

Moore, Martha, Principal, TW Environmental, Inc. 2004 (January 27 and February 3). Telephone conversations.

Moore, Randy, Reclamationist, DOGAMI. Telephone conversation. September 15, 2003.

Norman, Paul, Special Uses/Lands, Zigzag Ranger District, US Forest Service, Mt. Hood National Forest. 2003a (February 21). Telephone conversation.

_____. 2003b (September 16). Electronic mail.

Pelles-Madrid, Colleen, District Ranger, Zigzag Ranger District, US Forest Service, Mt. Hood National Forest. Meeting. January 27, 2003.

Turin, Dan, Jim Turin & Sons Inc. 2004 (March 8). Telephone conversation.

Walker, Kathleen, Recreation Assistant, Zigzag Ranger District, US Forest Service, Mt. Hood National Forest. Electronic mail communication. September 16, 2003. Sent to James Tierney, Infrastructure Team Leader, Clackamas River Ranger District, US Forest Service, Mt. Hood National Forest.

Walker, Kathleen, Recreation Assistant, Zigzag Ranger District, US Forest Service, Mt. Hood National Forest. Electronic mail communication. February 2, 2004.

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Chapter 12
Glossary of Terms

Minor corrections, clarifications, and edits are not included in this list.

12. GLOSSARY OF TERMS

Adverse impact – unfavorable, harmful, or detrimental environmental changes. Adverse impacts may be significant or not significant.

Alluvium – material transported and deposited by a stream or river, usually a coarse deposit composed of sand and rock.

Anadromous fish – those species of fish that mature in the sea and migrate into streams to spawn. Salmon, steelhead, and shad are examples.

Artifact – a single, portable object, made or altered by a human(s); usually culturally diagnostic.

Available runoff – total precipitation less evapotranspiration and infiltration. The amount of water not lost to infiltration into the soil, or uptake and transpiration by plants, or evaporation.

Average daily traffic (ADT) – the weighted 24 hour total of all vehicle trips to and from a site Monday through Friday.

Background – the visible terrain beyond the foreground and middleground where individual trees are not visible but are blended into the total fabric of the forest stand (see foreground and middleground).

Catchment –a 7th field hydrologic unit or drainage nested within a larger 6th field subwatershed. For example, the Mud Creek catchment is one of the smaller drainages that comprise the larger West and East Forks of the Salmon River 6th field subwatershed.

Class I Wilderness – a wilderness over 5,000 acres that was in existence as of August 7, 1977. All other National Forest System lands are Class II, including new wildernesses and expansions to Class I wildernesses that occurred after August 7, 1977.

Cultural resources – The cultural foundation of the US includes the remains or records of districts, sites, structures, buildings, networks, neighborhoods, memorials, objects, and events from the past that have scientific, historic, or cultural value. They may be historic, prehistoric, archaeological, or architectural in nature. Cultural resources are an irreplaceable and nonrenewable aspect of our national heritage.

Cumulative effects – the combined effects of two or more management activities. The effects may be related to the number of individual activities or to the number of repeated activities on the same piece of ground. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Dispersal habitat – Dispersal only habitat for the northern spotted owl generally consists of mid-seral stands between 40 to 80 years of age with canopy closures of 40 percent or greater and with trees of a mean dbh of 11 inches or greater (BLM and FS, 2002).

Dispersed recreation – outdoor recreation that takes place outside developed recreation sites or the Wilderness.

Disturbance regime – natural pattern of periodic disturbances, such as fire or flood, followed by a period of recovery from the disturbance, such as regrowth of a forest after fire.

Diversity – the distribution and abundance of different plant and animal communities and species within the area covered by a LRMP.

Effect/impact – environmental consequences as a result of a proposed action. Included are direct effects, which are caused by the action and occur at the same time and place, and indirect effects, which are caused by the action and are later in time or further removed in distance, but which are still reasonably foreseeable. Indirect effects may include population-growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air, water, and other natural systems, including ecosystems.

The terms "effects" and "impacts" as used in this statement are synonymous. Effects may be ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic quality, historic, cultural, economic, social, or health-related, whether direct, indirect, or cumulative. Effects resulting from actions may have both beneficial and detrimental aspects, even if on balance the agency believes that the overall effects would be beneficial (40 CFR 1508.8).

Effective ground cover – a continuous cover of organic material, such as plants or plant residues, like litter or duff, that protects soil materials from erosive forces.

Endangered species – any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Not included are members of the class Insects that have been determined by the Secretary to constitute a pest whose protection under the provisions of the Endangered Species Act of 1973 would present an overwhelming and overriding risk to man. An endangered species must be designated in the Federal Register by the appropriate Federal Agency Secretary.

Environment – the physical conditions that exist within the area that would be affected by a proposed project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historical or aesthetic significance. The "environment" includes both natural and manmade conditions.

Ephemeral stream – a stream or portion of a stream that flows only in direct response to precipitation or snow melt. It receives little or no water from springs and no long-continued supply from snow or other sources. Ephemeral drainages frequently have no permanent or well-defined channels, but follow slight depressions in the natural contour of the ground surface.

Erosion (accelerated) – erosion much more rapid than normal, primarily as a result of human influence or activities.

Erosion (surface) – wearing away of the earth's surface by water, ice, wind, or other natural agents under natural environmental conditions of climate, vegetation, etc., undisturbed by human influences.

Foreground – a term used in visual (scenery) management to describe the stand of trees immediately adjacent to a high-value scenic area, recreation facility, or forest highway (see background and middleground).

Glacial till – unstratified glacial drift deposited directly by ice and consisting of clay, sand, gravel, and boulders intermingled in any proportion.

Groundwater – water under the earth's surface, often confined to aquifers capable of supplying wells and springs.

Gully/rill erosion – the dislodgement of soil particles by a concentrated flow of water.

Habitat – a place where a plant or animal naturally or normally lives and grows.

Hazardous material – a material or form of energy that could cause injury or illness in humans, animals, or the natural environment.

Hydrology – the scientific study of the properties, distribution, and effects of water in the atmosphere, on the earth's surface, and in soil and rocks.

Igneous rock – rock that has formed by the cooling and consolidation of viscous rock, or magma.

Indicator species – a wildlife management scheme in which the welfare of a selected species is presumed to indicate the welfare of other species.

Intermittent stream – a stream that flows above ground at intervals or only flows periodically during the year. In contrast to ephemeral drainages (see definition), intermittent streams generally have well-defined channels.

Land use – the purpose or activity for which a piece of land or its buildings is designed, arranged, or intended, or for which it is occupied or maintained.

Mass wasting – the dislodgment and downhill transport of soil and rock materials under the influence of gravity. Many classifications of mass movement are identified, including soil creep, debris slides, rotational slides or slumps, and rock slides.

Matrix – federal lands outside of reserves, withdrawn areas, and Managed Late-Successional areas on which timber harvest and other silvicultural activities are allowed.

Middleground – the visible terrain beyond the foreground where individual trees are still visible but do not stand out distinctly from the stand.

Mitigation measures – actions to avoid, reduce, eliminate, or rectify the impact of a management practice or proposed action.

National Environmental Policy Act (NEPA) – an Act to declare a national policy that will encourage productive and enjoyable harmony between humans and their environment; to promote efforts that will prevent or eliminate damage to the environment and biosphere, and stimulate the health and welfare of humans; to enrich the understanding of the ecological systems and natural resources important to the nation; and to establish a Council on Environmental Quality.

Noxious weed – a plant considered to be extremely destructive or harmful to agriculture and designated by law. An undesirable species that conflicts with, restricts, or otherwise causes problems with management objectives.

Peak hour – in reference to transportation systems, the hour during which the highest percentage of traffic flow occurs.

Plant community – a vegetation complex unique in its combination of plants that occur in particular locations under particular influences. A plant community is a reflection of integrated environmental influences on the site, such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall.

Riparian – pertaining to areas of land directly influenced by water. Riparian areas usually have visible vegetative or physical characteristics reflecting this water influence. Streamsides, lake borders, or marshes and wetlands are typical riparian areas.

Riparian area – geographically delineated areas, with distinctive resource values and characteristics, that are composed of aquatic and riparian ecosystems. On the Mt. Hood National Forest, riparian areas typically include areas adjacent to all streams, lakes, and ponds, and areas comprising seeps, springs, and wetlands.

Salmonid – resembling or characteristic of a salmon; of or belonging to the family *Salmonidae*, which includes salmon, trout, and whitefish.

Seep – a site where groundwater is present at the surface.

Sensitive species –those species of plants or animals that have appeared in the Federal Register as proposed for classification and are under considerations for official listing as endangered or threatened species, that are on an official state list, or that are recognized by the Regional Forester as needing special management to prevent their being placed on federal or state lists.

Seral – a biotic community that is a developmental, transitory stage in an ecological succession.

Soil creep – the slow, downslope movement of weathered rock fragments and soil.

Stream order – the hierarchical ordering of streams based on the degree of branching. A first-order stream is an unforked or unbranched stream. Two first-order streams flow together to form a second-order stream, two second-order streams flow together to form a third-order stream, and so on.

Subwatershed – a 6th field hydrologic unit or drainage nested within a larger, 5th field hydrologic unit known as a watershed. For example: The West and East Forks of the Salmon River is just one of many 6th field hydrologic units or subwatersheds that comprise the larger Salmon River Watershed.

Thalli – pl. of thallus. The plant body of a thallophyte, which includes plant forms consisting of one cell and cell aggregates not clearly differentiated into root, stem, and leaf, including bacteria, algae, fungi, and lichens.

Threatened species – any species of animal or plant that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range and that has been designated in the Federal Register by the Secretary of Interior as a threatened species.

Topography – the graphical description on a map of the exact physical configuration of a place or region; the features of a place or region.

Viewpoint – a location from which a site is visible.

Viewshed – the total landscape seen or potentially seen from all or a logical part of a travel route, use area, or water body.

Visual Quality Objective (VQO) – a category of acceptable landscape alteration measured in degrees of deviation from the natural-appearing landscape.

Watershed – the line separating head-streams that flow into different river systems. It may be sharply defined (crest of a ridge) or indeterminate (in a low, undulating area).

Wetlands – areas that are inundated by surface or groundwater with a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Under normal circumstances the area does or would support a prevalence of vegetative or aquatic lift. Wetlands generally include swamps, marshes, bogs, and similar areas. As defined by federal agencies, wetlands are areas that contain soils showing signs of frequent and/or sustained inundation, plant species adapted to wet conditions, and signs of water movement through the area.

Tamarack Quarry Expansion Project

Final Environmental Impact Statement

Chapter 13
Index

Minor corrections, clarifications, and edits are not included in this list.

13. INDEX