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Draft Environmental Impact Statement

Mt. Hood Meadows Parking Improvements EIS

Mt. Hood National Forest, Hood River Ranger District
Hood River County

Mt. Hood Meadows Ski Lift

Mt. Hood Meadows
Parking Lot Improvements

Draft Environmental Impact Statement
Hood River County

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Executive Summary

Background

On peak days and weekends there is inadequate parking capacity at the Mt. Hood Meadows Ski Resort (MHM). MHM has seen a steady increase in skier visits over the past ten seasons and managers anticipate this trend would continue at a slightly higher rate than the estimated population growth of the Portland metropolitan area. Therefore, there is a need to provide additional parking to serve the current use at the ski area. Additionally, the need for expanded parking was identified in the Record of Decision (ROD) for Mt. Hood Meadows Ski Area Master Plan Final Environmental Impact Statement (Master Plan), including Forest Plan Amendment No. 10 (January 1997; p. 10).

When parking facilities are filled to capacity at the ski area, customers choose to park along the access roads to both the Main Parking Lot (Forest Service Road [FSR] 3555) and to the Hood River Meadows Parking Lot (FSR 3545), Highway 35, as well as Sno-parks located near Nordic ski trails along Highway 35. Parking along the access roads and highway, however, creates an unsafe situation when people are walking along these roads to reach the shuttle pick-up points. Also, as people park along the Hood River Meadows access road (FSR 3545) and highway, the northbound and southbound traffic on Highway 35 is slowed, and at peak ski traffic times, temporarily stopped due to traffic waiting to turn across the southbound lane onto the access road. This congestion created by the traffic can limit ingress and egress by emergency vehicles and shuttle buses, constrain the ability for snow plow equipment to operate safely and effectively, and limit driver line-of-sight along Highway 35.

Purpose and Need for Action

Because parking facilities at MHM are often filled to capacity, there is the need to provide additional parking within the MHM permit area. This need for expanded parking is also supported by the need to improve traffic flow and public and customer safety along the access routes (i.e., FSR 3545 and Highway 26) to MHM as well as within the Main Parking Lot.

The need for additional parking was identified in the ROD for the Master Plan (page 10). The need for new maintenance facilities also was identified in the ROD for the Master Plan (page 9). Therefore, the primary purposes of this project is to serve the design capacity for parking, including area for snow storage, and maintenance facilities that was conceptually approved while minimizing environmental impacts from parking lot construction and maintenance, as was outlined in the Master Plan in 1997.

Proposed Action

In order to address the needs stated in Section 1.3, Alternative 2 proposes to build the Twilight Parking Lot and Sunrise Maintenance Shop. In order to provide additional parking to serve current use and the design capacity that was conceptually approved in the ROD and Master Plan, a 7.2 acre parking lot for both downhill and Nordic customers at the Mt. Hood Meadows Ski Resort would be constructed. This new parking lot, referred to as the Twilight Parking Lot, would be located east of the Elk Meadows trailhead and west of the Oregon Department of

Transportation (ODOT) sand shed with access via FSR 3545. In total, 9.4 acres would be cleared for this parking lot, snow storage, and a storm water facility. The overall parking capacity for MHM would be 3,526 vehicles, including the additional 878 vehicles from the Twilight Parking Lot.

Also, to improve parking capacity as well as customer safety, the vehicle maintenance functions would be moved away from the Mt. Hood Meadows Main Parking Lot and located on the north side of the existing Sunrise Parking Lot. The new Sunrise Vehicle Maintenance Shop would be approximately 65 by 150 feet in size and constructed on 1.75 acres. The existing shop would initially be used for storage. The existing generators and electrical distribution would remain within the existing shop. It may be re-purposed for skier service in the future; however, this would potentially require additional site-specific NEPA depending on the proposed actions.

The Proposed Action also includes constructing the Twilight Parking Lot equipment maintenance yard (bus shop), constructing the associated access road, and constructing a Nordic guest services building. Lastly, the connected actions associated with this alternative are: installing utility lines (power, water, sewer and telephone) to service the new facilities; constructing left and right turn lanes from Highway 35 to FSR 3545; restoring an impacted wetland; and, constructing Nordic ski trails.

Overall, the Proposed Action would impact 17.6 acres of A11 lands within the Mt. Hood Meadows Ski Resort permit area, plus an additional 0.5 acres along Highway 35. This includes the acres of disturbance associated with the Twilight Parking Lot, Sunrise Maintenance Building, Twilight Parking Lot equipment maintenance yard (bus shop), utility lines, access road, and Nordic ski trail construction.

Alternatives

In total, the Forest Service developed six alternatives: No Action (Alternative 1), Proposed Action (Alternative 2), and four other action Alternatives (Alternatives 3, 4, 5 and 6). The No Action (Alternative 1) is defined as the current condition and was compared to the underlying need for action. As discussed above, Alternative 2 was developed in response to a proposal from MHM. Alternatives 3, 4, 5, and 6 were developed based on public and agency issues and concerns.

Alternatives 3 and 4 were designed to address Issue 1: Master Plan Consistency as well as Issue 2: Nordic Skiing. Alternative 3 was altered from Alternative 2 in order to create a similar Nordic skiing experience as the existing conditions. Alternative 4 was designed to be fully consistent with the Master Plan. This alternative also moves the proposed parking lot location to minimize impacts to the existing Nordic ski trails. Alternative 5 addresses Issue 2 by moving the proposed parking lot location, but it more closely resembles the initial proposals submitted by MHM in overall parking capacity. Lastly, Alternative 6 was developed as the Preferred Alternative after considering public involvement and the environmental consequences presented in Chapter 3.

Some alternatives that would resolve public concerns were eliminated from detailed study because they do not meet the purpose and need for action, were not reasonably feasible or viable, were duplicative of the alternatives considered in detail, or were determined to cause unnecessary environmental harm. Four alternatives were considered, but eliminated from detailed

consideration. The alternatives were: Highway 35 Temporary Bypass Repurpose Alternative; Bear Grass Loop Parking Lot Alternative; Hood River Meadows (HRM) Expansion Alternative; and, Mass Transit Alternative.

Effects Analysis

Implementation of any action alternative would cause some adverse environmental effects that cannot be effectively mitigated or avoided. The majority of the unavailable adverse effects are associated with removing forested lands and replacing them with parking lots and other paved surfaces within the MHM permit area. Most adverse effects can be reduced, mitigated or avoided by limiting the extent or duration of effects. The application of Forest Plan standards and guidelines, Best Management Practices, PDC, and monitoring are all intended to further limit the extent, severity, and duration of potential effects.

Chapter 3 provides environmental analysis of the all of the alternatives for each resource area including recreation, transportation, soil productivity, water quality, aquatics, wildlife, botany, noxious weeds, cultural resources, visuals, air quality and climate change. The following list summaries some of the findings detailed in Chapter 3.

- None of the alternatives would result in visitation levels that exceed the winter designed capacity established in the Master Plan for lifts, groomed ski trails, and skier service facilities (Master Plan, p. 9).
- Alternatives 2 and 3 would have the greatest effects on the existing Nordic trail system (including difficulty ratings). Alternative 2 replaces the curved undulating trails with much more straight/uniform trails. Alternatives 3 and 6 replace the loss of the trails with similar curved turns on undulating terrain. Alternatives 4 and 5, however, would only slightly modify the existing trails; thus, any changes to the skier experience and difficulty ratings would be negligible.
- Alternatives 4 and 5 would have the greatest effects on the existing hiking trails within the Permit Area. They would both require minor reroutes on Sahalie Falls Trail (#667C). All action alternatives would require the Sahalie Falls Trail (#667c) and Elk Meadows Trail (#645) to be temporarily closed while the utility lines are being installed to the proposed parking areas.
- Each of the action alternatives, may have an adverse impact on transportation operations of safety and congestion. The added traffic volumes for each action alternative may increase the existing transportation safety issues of US 26/OR 35, which are currently labeled as safety corridors. Alternative 2, 3, and 5 would have the most effect on increasing transportation operations of safety and congestion.
- If an action alternative is chosen, there would be an irretrievable loss of soil resource. Due to the total size in acres, Alternative 3 would be the most impactful overall. The Sunrise Vehicle Maintenance Shop has the least potential impact in Alternative 5 due to water and/or wetland considerations identified in Alternatives 2, 3, and 4. Alternatives 2 and 5 are nearly the same in overall acreage, but Alternative 5 maximizes the Twilight Parking Lot size in a different location, which then reduces the need to replace several acres of Nordic trail. Alternative 4 is the least impactful of all action alternatives due to the smaller footprint and location that reduces the need to replace Nordic trails.

- All action alternatives would have some disturbance in the Riparian Reserves. Disturbance in the Riparian Reserves associated with the new Sunrise Vehicle Maintenance Shop in Alternative 3 has some risk of increasing water temperature, sediment and chemical contaminants due to the close proximity to a wetland/stream and complete removal of approximately 400 linear feet of riparian vegetation. Alternative 2 has risk of increased sedimentation due to snow removal limitations in the Sunrise Parking Lot footprint posed by the new Sunrise Vehicle Maintenance Shop. All of the above effects are anticipated to be localized and most likely only noticeable at the site scale. While all action alternatives propose to increase impervious surfaces, the total is still below levels of concern.

- The left- and right-turn lanes proposal is the same for all action alternatives. Potential impacts are an increased risk of direct effects to cutthroat trout and Scott's Apatanian caddisfly due to disturbance during construction activities and then small, short-term increases in fine sediment to Meadows Creek and potentially the relocated wetland adjacent to Highway 35.

- There would be no impact to Meadows Creek regardless of the action alternative from the proposed Twilight Parking Lot (and associated access road and maintenance area), Nordic ski trails, utility lines, or Sahalie Falls Trail re-route due to the location of the proposed infrastructure and PDC. The slight overlap with Riparian Reserves in some alternatives would not impair stream or floodplain function.

- Under all alternatives, suitable habitat for Northern spotted owls would be reduced in the core and home range for the spotted owl pair that are being impacted. There is **likely to adversely affect** call for this project across all alternatives because of the suitable habitat being removed. The amount removed when comparing all alternatives, however, never puts the habitat below US Fish and Wildlife Service thresholds for take. There are no disruption impacts from noise because work for all alternatives is outside the disruption distances. Alternatives 2, 3 and 6 keep the majority of the construction and removal farther from the spotted owl nest patch. Alternatives 4 and 5 are in closer proximity, but outside the disruption distances. Alternative 4 has the least amount of impacts because of smaller lot size and there is no new creation of Nordic trails keeping more of the project in the existing condition.

- Mule Deer and Elk would be impacted by Twilight Parking Lot, Twilight Equipment Maintenance Yard, and Nordic Trails in all action alternatives. Alternatives 4 and 5 are closer to the other summer disturbances and allows for more security in the north eastern portion of the permit area, while Alternatives 2 and 3 spread the components out and fragment more of the permit area, they also potentially impact migration routes in the east to west direction due to the rectangular forms of the lots creating a line of potential avoidance due to pavement when including the HRM Lot and ODOT sand shed.

- Snag and down log associated species would lose habitat, but at the project and watershed scales are not impaired overall.

- Neotropical migratory birds would lose some habitat associated with the action alternatives. The amount of tree removal for all alternatives, however, is small when compared to the habitat available within the watershed and on the District.

- A Moderate Noxious Risk ranking has been determined for each proposed action alternative for the following reasons: 1) Heavy equipment (implied ground disturbance including compaction or loss of soil); 2) Importing soil/cinders/gravel/straw or hay mulch; 3) ORVs (off-road vehicles) or ATVs (all-terrain vehicles) associated with project activity; 4) Plant restoration; 5) Recreationists (i.e., foot traffic associated and unassociated with the project); 6) Forest Service or other project vehicles.

- The improvements proposed in Alternatives 2 through 6 would permanently remove from 6 to 14 acres of huckleberry plants; however, some huckleberry rejuvenation may occur along the open margins of the parking lots and Nordic trails. The Project Design Criteria also specifies that all open disturbed areas would be seeded with native seed, which includes species common to the huckleberry-beargrass plant association. Mitigation measures developed in collaboration with the Confederated Tribes of Warm Springs (CTWS) have minimized impacts to culturally significant plant resources.

- All alternatives would have no or a negligible effect on climate change, greenhouse gases (GHG), or loss of carbon storage. The project proposes to permanently remove from 9.4 to 22 acres of forest trees to construct a parking lot designed to serve current use and improve public safety. The generation of GHG during construction, maintenance, and snow plowing of the parking lot and associated activities would be relatively minor and short term. With the Forest's tremendous capacity to sequester and store carbon, the loss of forest trees under the action alternatives is unlikely to have a measurable effect on climate change.

Preferred Alternative

The Preferred Alternative for this project is Alternative 6. The Responsible Official feels this alternative best responds to the public comments received during the scoping period and throughout the planning process.

Table of Content

Chapter 1 - Purpose and Need for Action 1-1
1.0 Introduction – Purpose and Need for Action 1-3
1.1. Document Structure 1-3
1.2. Background 1-4
1.3. Purpose of and Need for Action 1-5
1.3.1 Management Direction 1-7
1.3.2 Desired Future Condition 1-10
1.4. Proposed Action (Alternative 2) 1-11
1.5. Decision Framework 1-16
1.6. Public Involvement 1-17
1.7. Issues 1-17
1.7.1. Issues 1-18
1.7.2. Other Concerns 1-20
Chapter 2 - Alternatives, including the Proposed Action 2-1
2.0. Alternatives, including the Proposed Action 2-3
2.1. Alternative Development Process 2-3
2.2. Alternatives Considered in Detail 2-4
2.2.1 Alternative 1 – No Action Alternative 2-4
2.2.2 Alternative 2 – Proposed Action 2-4
2.2.3 Alternative 3 – New Nordic Trails 2-7
2.2.4 Alternative 4 – Elk Meadow Master Plan 2-12
2.2.5 Alternative 5 – Elk Meadow 2-17
2.2.6 Alternative 6 – Preferred Alternative 2-22
2.3. Project Design Criteria 2-26
2.4. Monitoring Framework 2-34
2.5. Comparison of Alternatives 2-36
2.6. Alternatives Considered, but Eliminated from Detailed Study 2-43
2.6.1. Highway 35 Temporary Bypass Repurpose Alternative 2-43
2.6.2. Bear Grass Loop Parking Lot Alternative 2-45
2.6.3. HRM Expansion Alternative 2-46
2.6.4. Mass Transit Alternative 2-46
Chapter 3 - Affected Environment and Environmental Consequences 3-1
3.0. Affected Environment and Environmental Consequences 3-3
3.1. Recreation 3-4
3.1.1. Analysis Assumptions and Methodology 3-4
3.1.2. Existing Condition 3-5
3.1.3. Effects Analysis/Environmental Consequences 3-9
3.1.4 Consistency Determination 3-26
3.1.5 Summary of Effects by Alternative 3-27
3.1.6 Incomplete and Unavailable Information 3-28
3.2. Transportation 3-28
3.2.1 Analysis Assumptions and Methodology 3-28
3.2.2. Existing Condition 3-32
3.2.3 Effects Analysis/Environmental Consequences 3-36
3.2.4 Consistency Determination 3-42
3.2.5 Oregon Department of Transportation Mitigation Strategy 3-43
3.2.6 Summary of Effects by Alternatives 3-45
3.2.7 Incomplete and Unavailable Information 3-45
3.3. Soil Productivity 3-45

3.3.1 Methodology and Assumptions 3-45
3.3.2 Existing Condition 3-48
3.3.3 Effects Analysis/Environmental Consequences 3-52
3.3.4 Consistency Determination 3-56
3.3.5 Summary of Effects by Alternative 3-57
3.3.6 Incomplete and Unavailable Information 3-58
3.4. Water Quality 3-58
3.4.1 Analysis Assumptions and Methodology 3-58
3.4.2 Existing Condition 3-59
3.4.3 Effects Analysis/Environmental Consequences 3-64
3.4.4 Consistency Determination 3-89
3.4.5 Summary of Effects by Alternative 3-91
3.4.6 Incomplete and Unavailable Information 3-91
3.5. Aquatics 3-92
3.5.1 Introduction 3-92
3.5.2 Analysis Assumptions and Methodology 3-92
3.5.3 Existing Condition 3-93
3.5.4. Effects Analysis/Environmental Consequences 3-106
3.5.5 Determination of Effect Including Essential Fish Habitat 3-129
3.5.6 Summary of Effects by Action Alternative 3-129
3.5.7 Consistency Determination 3-131
3.5.8 Incomplete and Unavailable Information 3-132
3.6 Aquatic Conservation Strategy 3-132
3.7 Wildlife 3-135
3.7.1 Introduction 3-135
3.7.2 Existing Conditions 3-135
3.7.3 Direct, Indirect and Cumulative Effects 3-150
3.7.4 Consistency Determination 3-167
3.7.5 Summary of Effects By Action Alternative 3-167
3.7.6 Incomplete and Unavailable Information 3-168
3.8 Botany 3-168
3.8.1 Background 3-168
3.8.2 Analysis Assumptions and Methodology 3-170
3.8.3 Existing Condition 3-175
3.8.4 Effects Analysis/Environmental Consequences 3-182
3.8.5 Consistency Determination 3-184
3.8.6 Summary of Effects 3-186
3.8.7 Incomplete and Unavailable Information 3-186
3.9 Noxious Weed 3-186
3.9.1 Introduction 3-186
3.9.2 Analysis Assumptions and Methodology 3-191
3.9.3 Existing Condition 3-192
3.9.4 Effects Analysis/Environmental Consequences 3-192
3.9.5 Consistency Determination 3-194
3.9.6 Summary of Effects 3-194
3.9.7 Incomplete and Unavailable Information 3-195
3.10 Cultural Resources 3-195
3.10.1 Analysis Assumptions and Methodology 3-195
3.10.2 Existing Condition 3-196
3.10.3 Effects Analysis/Environmental Consequences 3-197
3.10.4 Consistency Determination 3-200
3.10.5 Summary of Effects 3-201
3.10.6 Incomplete and Unavailable Information 3-201

3.11 Visual Management 3-201
3.11.1 Analysis Assumptions and Methodology 3-201
3.11.2 Existing Condition 3-202
3.11.3 Effects Analysis/Environmental Consequences 3-204
3.11.4 Consistency Determination 3-211
3.11.5 Summary of Effects 3-212
3.11.6 Incomplete and Unavailable Information 3-212
3.12 Vegetation Management 3-212
3.12.1 Analysis Assumptions and Methodology 3-212
3.12.2 Existing Condition 3-213
3.12.3 Effects Analysis/Environmental Consequences 3-214
3.12.4 Consistency Determination 3-215
3.12.5 Incomplete and Unavailable Information 3-216
3.13 Air Quality 3-216
3.13.1 Analysis Assumptions and Methodology 3-216
3.13.2 Existing Condition 3-216
3.13.3 Effects Analysis/Environmental Consequences 3-219
3.13.4 Consistency Determination 3-220
3.13.5 Incomplete and Unavailable Information 3-220
3.14 Climate Change 3-221
3.14.1 Analysis Assumptions and Methodology 3-221
3.14.2 Existing Condition 3-222
3.14.3 Effects Analysis/Environmental Consequences 3-223
3.14.4 Summary of Effects by Alternative 3-226
3.14.5 Incomplete and Unavailable Information 3-226
3.15. Other Required Disclosures 3-226
3.15.1 Adverse Environmental Effects that Cannot be Avoided 3-226
3.15.2 Short-term Uses and Maintenance of Long-term Productivity 3-227
3.15.3 Irreversible or Irretrievable Commitments of Resources 3-227
3.15.4 Effects on Consumers, Civil Rights, Minority Groups, Women and Environmental Justice 3-230
3.15.5 Compliance with Section 504 of the Vocation Rehabilitation Act and the Americans with Disabilities Act (ADA) 3-230
3.15.6 Treaty Resources and Reserved Indian Rights 3-230
3.15.7 Congressional Designated Lands, Inventoried Roadless Area, and Unroaded Areas 3-231
3.15.8 Prime Farmlands, Rangelands, and Forestlands 3-231
3.15.9 Wetlands and Floodplains 3-231
3.15.10 Potential or Unusual Expenditures of Energy 3-232
3.15.11 Cumulative Effects 3-232
3.15.12 Conflicts with Plans or Policies of Other Jurisdictions 3-232
Chapter 4 - Consultation and Coordination 4-1
4.0. Consultation and Coordination 4-3
4.1. Federal, State and Local Agencies 4-3
4.1.1 Consultation with U.S. Fish and Wildlife Service (FWS) 4-3
4.1.2. Consultation with National Marine Fisheries Service (NOAA Fisheries) 4-3
4.1.3. Consultation with Oregon State Historic Preservation Office (SHPO) 4-4
4.1.4. Consultation with Oregon Department of Transportation (ODOT) 4-4
4.2. Tribal Consultation 4-7
4.3. Preparers and Contributors 4-7
4.4. Distribution List for Draft EIS 4-10
Appendix A - BMPs A-1

References **R-1**
Index **I-1**

List of Tables

Table 2-1: Comparison of Twilight Parking Lot features for Action Alternatives 2-36
Table 2-2: Comparison of Sunrise Maintenance Shop features for Action Alternatives 2-37
Table 2-3: Comparison of the Connected Actions 2-37
Table 2-4: Comparison of Alternatives by Purpose and Need Components, Proposed Action Elements, Connected Actions and Issues 2-38
Table 3-1: List of Projects Considered in Cumulative Effects Analysis 3-3
Table 3-2: Existing Length of Nordic Trails by Difficulty Ratings. 3-7
Table 3-3: Existing Acres of Parking at MHM. 3-8
Table 3-4: Estimated Existing Acres and Vehicles at MHM Compared to Master Plan. 3-8
Table 3-5: Length of Nordic Trails by Difficulty Ratings 3-11
Table 3-6: (Alternative 2.) Estimated Parking/Capacities vs. Master Plan. 3-13
Table 3-7: Length of Nordic Trails by Difficulty Ratings 3-14
Table 3-8: Estimated Parking/Capacities in Alternative 3 compared to The Master Plan. 3-15
Table 3-9: Estimated Parking/Capacities in Alternative 4 compared to the Master Plan. 3-18
Table 3-10: Estimated Parking/Capacities for Alternative compared to the Master Plan. 3-21
Table 3-11: Length of Nordic Trails by Difficulty Ratings 3-24
Table 3-12: Estimated Parking/Capacities for Alternative compared to the Master Plan. 3-24
Table 3-13: Cumulative Effects for Recreation 3-25
Table 3-14: Estimated Acres of Forested Lands Effected 3-28
Table 3-15: Results of ODOT's Road Safety Audit 2009 3-31
Table 3-16: Results of ODOT's Road Safety Audit 2011 3-32
Table 3-17: Existing Parking Lot Summary 3-33
Table 3-18: Existing Mt. Hood Meadows Traffic 3-34
Table 3-19: Trip Generation Estimate 3-37
Table 3-20: Mt. Hood Meadows Traffic (Alternative 2) 3-38
Table 3-21: Mt. Hood Meadows Traffic (Alternative 3) 3-39
Table 3-22: Mt. Hood Meadows Traffic (Alternative 4) 3-39
Table 3-23: Mt. Hood Meadows Traffic (Alternative 5) 3-40
Table 3-24: Cumulative Effects for Transportation 3-41
Table 3-25: Transportation Demand Management Program 3-44
Table 3-26: Summary of Forest Plan soil standards guiding the soils analysis. Full texts of these standards are on pages Four-49 and Four-50 of the LRMP. 3-48
Table 3-27: Summary of soil types in the analysis area and associated management interpretations taken directly from the Mt. Hood SRI. 3-51
Table 3-28: Summary of soil types in the analysis area and associated management interpretations modified (highlighted in italics) by field observations in the analysis areas. 3-51
Table 3-29: Summary of Potential Exposed Ground by Action Alternative. 3-54
Table 3-30: Summary of Potential Exposed Ground by Alternative. 3-55
Table 3-31: Summary of Potential Clearing for Nordic Trail Replacement by Alternative. 3-56
Table 3-32: Summary of Soil Effects by Alternative 3-57
Table 3-33: Strengths and Weaknesses of the Water Quality Analysis Approach 3-59
Table 3-34: Width of Primary Shade Zone 3-65
Table 3-35: Disturbance in Riparian Reserves by Alternative 3-66
Table 3-36: Qualitative Assessment of Connectivity to Surface Water For Disturbance in Riparian Reserves for Alternative 2 3-67
Table 3-37: Summary of water quality indicators for Alternative 2 3-71
Table 3-38: Cumulative Effects for Water Quality 3-72

Table 3-39: Qualitative Assessment of Connectivity to Surface Water For Disturbance in Riparian Reserves for Alternative 3 3-75
Table 3-40: Summary of water quality indicators for Alternative 3....3-76
Table 3-41: Cumulative Effects for Water Quality 3-77
Table 3-42: Qualitative Assessment of Connectivity to Surface Water For Disturbance in Riparian Reserves for Alternative 4 3-79
Table 3-43: Summary of water quality indicators for Alternative 4....3-80
Table 3-44: Cumulative Effects for Water Quality 3-81
Table 3-45: Qualitative Assessment of Connectivity to Surface Water For Disturbance in Riparian Reserves for Alternative 5 3-83
Table 3-46: Summary of water quality indicators for Alternative 5....3-84
Table 3-47: Cumulative Effects for Water Quality....3-85
Table 3-48: Qualitative Assessment of Connectivity to Surface Water For Disturbance in Riparian Reserves for Alternative 6 3-86
Table 3-49: Summary of water quality indicators for Alternative 6....3-88
Table 3-50: Cumulative Effects for Water Quality 3-88
Table 3-51: Summary of Effects by Alternative 3-91
Table 3-52: Region 6 (R6) special status species either documented (D) or suspected (S) to reside within the Mt. Hood National Forest.. 3-100
Table 3-53: Stream surface substrate conditions within representative sections of Mitchell and Meadows Creeks within the affected environment.. 3-104
Table 3-54: Potential direct effects resulting from project activities proposed in all action alternatives. 3-109
Table 3-55: Summary of cumulative effects to aquatic fauna and habitat in Alternative 2 3-117
Table 3-56: Summary of cumulative effects to aquatic fauna and habitat associated with those aspects of Alternative 3 that differ from Alternative 2 3-124
Table 3-57: Summary of cumulative effects to aquatic fauna and habitat associated with those aspects of Alternative 4 that differ from Alternative 2 3-127
Table 3-58: List of federally threatened and R6 sensitive fish and aquatic macroinvertebrate species found on the Mt. Hood National Forest and addressed in this Biological Evaluation. 3-131
Table 3-59: ACS Objective Indicators in the EIS 3-133
Table 3-60: ACS Objective Indicators for each Alternative 3-134
Table 3-61: Survey Results of threatened, endangered, and proposed species; Forest Service Region 6 sensitive species; Survey and Manage species; and Management Indicator Species in the project area (includes surveys completed for previous projects)....3-135
Table 3-62: Amount of habitat and percent of available habitat in Core Area and Home Range....3-140
Table 3-63: Management Indicator Species for the Project Area....3-144
Table 3-64: Focal Migratory Bird Species....3-150
Table 3-65: Suitable habitat removal for each alternative and percent suitable remaining in core areas and home ranges after reduction of suitable habitat. 3-159
Table 3-66: ODA Noxious Weed List....3-187
Table 3-67: Supplemental List of Invasive Plants for the Hood River Ranger District 3-190
Table 3-68: Weed Risk Ranking Results 3-192
Table 3-69: VQOs for A11 Winter Recreation Management Areas (Forest Plan)....3-204
Table 3-70: Partial Retention Distances Zones as Viewed from Highway 35....3-205
Table 3-71: Partial Retention Distances Zones as Viewed from Forest Road 3545 (Sahalie Falls Road) 3-206
Table 3-72: Trails Evaluated for VQO....3-207
Table 3-73: VQO's as view from Recreation Sites along Highway 35, N. Bennett Pass 3-208
Table 3-74: Cumulative Effects for Visuals 3-209
Table 3-75: Scenic Direct and Indirect Effects Summary 3-212
Table 3-76: State and Federal air quality standards....3-217

Table 3-77: Cumulative Effects for Air Quality 3-221
Table 3-78: Adverse Effects that Cannot be Avoided for Alternatives 2-6....3-229
Table 4-1: ODOT Recommendations and Forest Service Response 4-5

List of Figures

Figure 1-1: Vicinity Map for Mt. Hood Meadows Ski Resort permit area 1-6
Figure 1-2: Overview Map for Alternative 2 – Proposed Action 1-13
Figure 1-3: Alternative 2, Twilight Parking Lot 1-14
Figure 1-4: Alternative 2, Sunrise Vehicle Maintenance Shop 1-15
Figure 2-1: Overview Map for Alternative 3 – New Nordic Trails 2-9
Figure 2-2: Alternative 3, Twilight Parking Lot 2-10
Figure 2-3: Alternative 3, Sunrise Vehicle Maintenance Shop 2-11
Figure 2-4: Overview Map for Alternative 4 – Elk Meadow Master Plan 2-14
Figure 2-5: Alternative 4, Twilight Parking Lot 2-15
Figure 2-6: Alternatives 4, 5 and 6, Sunrise Vehicle Maintenance Shop....2-16
Figure 2-7: Sahalie Falls Trail Re-route for Alternative 4 2-17
Figure 2-8: Overview Map for Alternative 5 – Elk Meadow 2-20
Figure 2-9: Alternative 5, Twilight Parking Lot 2-21
Figure 2-10: Sahalie Falls Trail Re-route for Alternative 5 2-22
Figure 2-11: Overview Map for Alternative 6 – Preferred Alternative 2-25
Figure 3-1: Annual Visitation to MHM in the Past 10 years....3-6
Figure 3-2: Alternative 2 (Proposed Action) in Relation to the Existing Nordic Ski Trails....3-12
Figure 3-3: Alternative 3 in Relation to Nordic Ski Trails. 3-16
Figure 3-4: Alternative 4 in Relation to Nordic Ski Trails. 3-17
Figure 3-5: Alternative 4 Elk Meadows Trail Reroute. 3-19
Figure 3-6: Alternative 5 in Relation to Nordic Ski Trails. 3-20
Figure 3-7: Alternative 5 Trail Reroute....3-22
Figure 3-8: Alternative 6 in Relation to Nordic Ski Trails. 3-23
Figure 3-9: Parking Lot Locations 3-30
Figure 3-10: Traffic Volume Summaries....3-35
Figure 3-11: Locations of old channels overlaid by all action alternatives. 3-50
Figure 3-12: Map of the Water Quality Analysis Area (7th field watersheds used in the Water Quality Analysis)....3-60
Figure 3-13: Map of the Alternative 2 Maintenance Shop Location 3-69
Figure 3-14: Map of the Alternative 3 Maintenance Shop Location 3-74
Figure 3-15. A photograph of a representative section of Mitchell Creek located within the affected environment. 3-103
Figure 3-16. A photograph of a representative meadow section of the unnamed tributary to Mitchell Creek located within the affected environment 3-103
Figure 3-17: A photograph of a representative section of Meadows Creek located within the affected environment. 3-104
Figure 3-18: Lidar imagery that shows the location of the anticipated left- and right-turn lanes disturbance (purple) in relation to Meadows Creek (blue line) and its Riparian Reserve (light blue shading), and the small wetland north of Highway 35 (red line). 3-108
Figure 3-19: Photograph taken from the north side of Highway 35 looking southwest towards the wetland (shaded blue) adjacent to Highway 35 at the FSR 3545 junction (red arrow). 3-111
Figure 3-20: Comparison for Current and Reference Condition for Snags. 3-166
Figure 3-21: Twilight Parking Area as seen from Elk Meadows Parking Area. 3-206
Figure 3-22: Left- and Right-turn Lanes as viewed from the Key Observation Point (KOP) at Teacup Sno-Park. 3-208
Figure 3-23: Vegatiative screening at Bennet Pass Sno-Park (KOP) 3-209

Chapter 1 - Purpose and Need for Action

1.0 Introduction – Purpose and Need for Action

In March 2009, Mt. Hood Meadows Ski Resort (MHM) requested the Forest Service consider a proposal to build a new parking lot east of Elk Meadows trailhead and west of the Oregon Department of Transportation sand shed with access via Forest Service Road 3545. In addition to the new parking lot, MHM requested the Forest Service to consider their proposal to move and upgrade the vehicle maintenance building in April 2011. The Forest Service has worked with MHM to refine the proposals and is moving forward with the environmental analysis for these projects as well as the associated connected actions. Pursuant to the direction in the Record of Decision for Mt. Hood Meadows Ski Area Master Plan, Final Environmental Impact Statement, including Forest Plan Amendment No. 10, this Draft Environmental Impact State will analyze the environmental consequences of the proposed parking improvements at MHM.

1.1. Document Structure

The US Forest Service has prepared this Draft Environmental Impact Statement (DEIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This DEIS discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four parts:

- Chapter 1: Introduction – This chapter includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Mt. Hood National Forest informed the public of the proposal and how the public responded.

- Chapter 2: Comparison of Alternatives, including the Proposed Action – This chapter provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes project design criteria. Finally, this section provides a summary table of the environmental consequences associated with each alternative.

- Chapter 3: Affected Environment and Environmental Consequences – This chapter describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.

- Chapters 4: Consultation and Coordination – This chapter provides a list of preparers and agencies consulted during the development of the environmental analysis, as well as a distribution list of the DEIS.

Additional documentation, including more detailed analyses of project area resources, may be found in the project record located at the Hood River Ranger District in Mount Hood/Parkdale, Oregon.

1.2. Background

Mt. Hood Meadows Ski Resort has seen a steady increase in skier visits over the past ten seasons and managers anticipate this trend will continue at a slightly higher rate than the estimated population growth of the Portland metropolitan area. Since opening in 1967/68, the number of skier visits has grown from 55,564 to over 500,000. During the 1970s, the average annual rate of growth was twice the Oregon average at 4.6 percent. From 1984 to 1989, the average annual rate of growth has been 2.14 percent, with an annual average of 325,000 skier visits. During the 2007/08 ski season, the number visitations at MHM peaked at over 500,000 visits. The 10-year average for annual visitation from 2001 to 2011 was 409,514 and the three-year average from 2008 to 2011 was 441,108 visits. Based on this trend, use of the ski area is expected to continue to increase.

Simultaneously, ski development has grown to 87 trails with the longest run being 15,840 feet. MHM currently consists of 2,150 skiable acres with the total of 13 ski lifts (six high speed quads, five double chairlifts, and two snow conveyers). The uphill lift capacity is 16,145 people per hour. MHM is currently operating within the designed capacity of 13,900 (13,100 alpine and 800 nordic) People At One Time (PAOT) for winter use as is authorized within the Record of Decision (ROD) for the Mt. Hood Meadows Ski Area Master Plan Final Environmental Impact Statement, including Forest Plan Amendment No. 10 (Master Plan). Designed capacity (authorized of winter use) is based on several factors, including the number of ski lifts and acres of ski trails. It is not an overall target for development and environmental factors may necessitate lower levels of development. PAOT is a quantified number of individuals that could be using the facilities at MHM at the same time.

MHM currently provides parking at three parking areas: 1) Main Lodge Base; 2) Sunrise Annex Lot; and, 3) Hood River Meadow Lot (HRM). Storm water management and snow storage are incorporated into the design of the existing parking areas. Including the areas used for storm water and snow storage, the total area cleared to facilitate parking is 35.8 acres (see Section 3.1, Recreation). Approximately 22 acres of this are used solely as space for parking. In addition to the on-site parking, shuttle services are offered to bring people to the resort.

There is generally adequate parking within the three parking areas at MHM during weekdays. However, during peak use days, typically occurring on holidays and weekends, all three of the existing parking lots are near capacity and/or reach their maximum capacity. As the lots fill, roadside signs inform visitors as to which lots to use. Users are guided by parking lot attendees to appropriate areas and generally walk or take shuttle buses to the needed facilities or ski lift access. On peak use days this experience can involve a long walk from the back of the lots carrying downhill equipment. In the event that the parking areas reach maximum capacity, users are turned away. These visitors have continued to attempt to find additional parking in other less desirable and potentially dangerous locations, such as alongside Highway 35 or FSR 3545.

In addition, MHM operates a Nordic Center within the HRM parking lot. It currently provides equipment rental, ticket sales and Nordic skiing lessons. Parking for the Nordic Center/Trails is currently shared with the HRM parking lot and lift access. The Nordic Center facilities are located at the opposite side of the parking area from the HRM facilities and lift access. As a result, parking is almost always available for the Nordic Center. On peak use days however, parking for both Nordic and downhill skiing can become scarce. In the event the ski resort reaches maximum capacity, visitors for both uses are turned away.

Further, the existing maintenance facilities are co-located in the Mt Hood Meadows Main Parking Lot. These facilities, built in 1967, are not large enough to service the number and size of the snow cat, snowmobile, truck, and bus fleet. As a result, the industrial buses are parked and serviced outside the maintenance facilities. Combining the industrial bus parking and vehicle maintenance functions with the public areas at the Main Parking Lot presents safety concerns related to traffic flow and the maintenance activities outside the facilities. Also, the location of the current maintenance shop removes potential parking capacity at the Main Parking lot.

When parking facilities are filled to capacity at the ski area, customers choose to park along the access roads to both the Main Parking Lot (FSR 3555) and to the Hood River Meadows Parking Lot (FSR 3545), Highway 35, as well as Sno-Parks located near Nordic ski trails along Highway 35. Parking along the access roads and highway, however, creates an unsafe situation when people are walking along these roads to reach the shuttle pick-up points. Also, as people park along the Hood River Meadows access road (FSR 3545) and highway, the northbound and southbound traffic on Highway 35 is slowed, and at peak ski traffic times, temporarily stopped due to traffic waiting to turn across the southbound lane onto the access road. This congestion created by the traffic can limit ingress and egress by emergency vehicles and shuttle buses, constrain the ability for snow plow equipment to operate safely and effectively, and limit driver line-of-sight along Highway 35.

1.3. Purpose of and Need for Action

Because parking facilities at MHM are often filled to capacity, there is the need to provide additional parking within the MHM permit area. This need for expanded parking is also supported by the need to improve traffic flow and public and customer safety along the access routes (i.e., FSR 3545 and Highway 26) to MHM as well as within the Main Parking Lot.

The need for additional parking was identified in the ROD for the Master Plan (page 10). The need for new maintenance facilities also was identified in the ROD for the Master Plan (page 9). Therefore, the primary purposes of this project is to serve the design capacity for parking, including area for snow storage, and maintenance facilities that was conceptually approved while minimizing environmental impacts from parking lot construction and maintenance, as was outlined in the Master Plan in 1997.

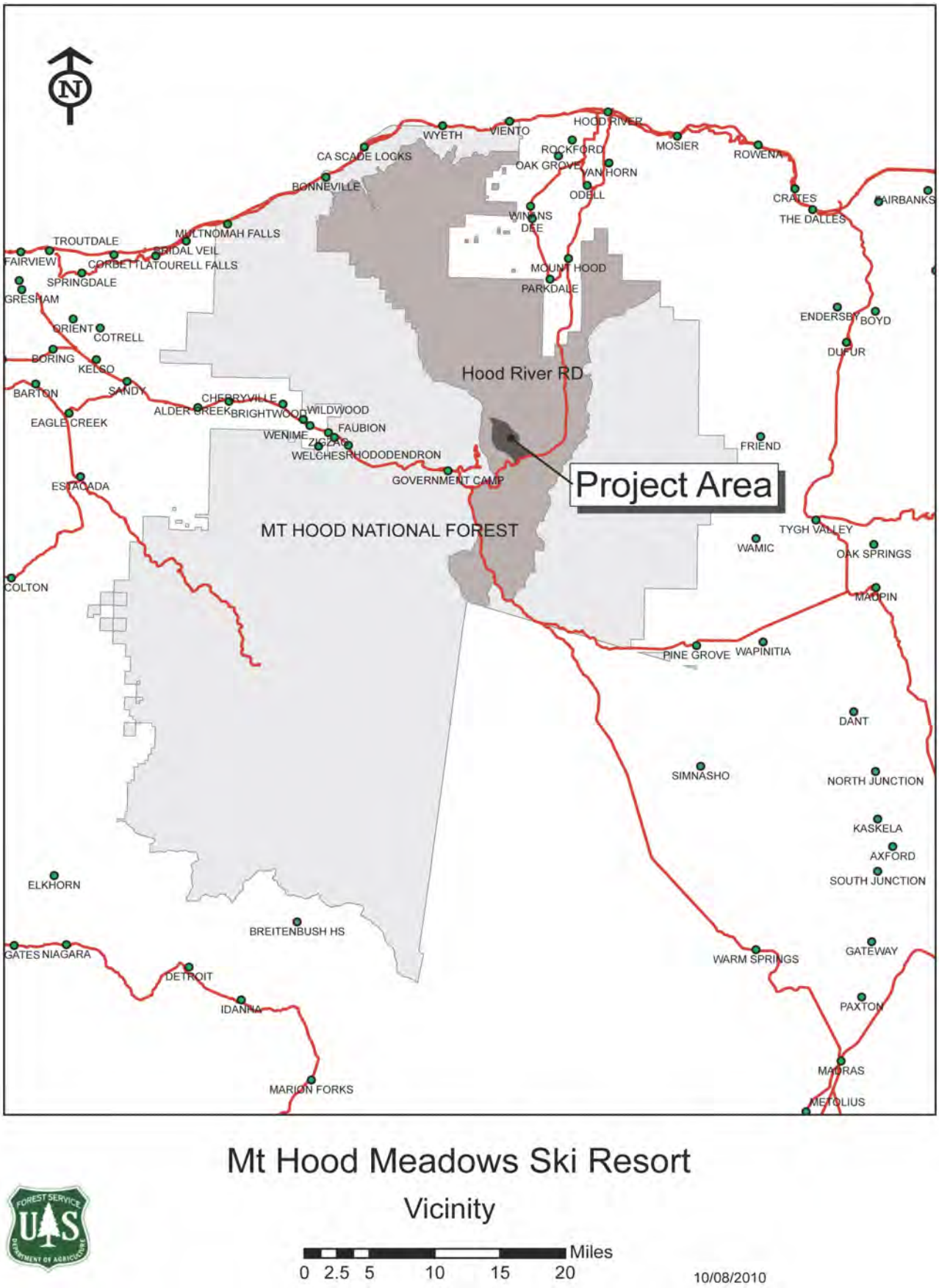

Figure 1-1: Vicinity Map for Mt. Hood Meadows Ski Resort permit area

The geographic scope of the project includes the Mt. Hood Meadows Ski Resort permit area and access road to the permit area. See Figure 1-1, Vicinity Map for the location of the permit area.

1.3.1 Management Direction

This environmental analysis process has been completed in accordance with direction contained in the National Forest Management Act, National Environmental Policy Act, Council on Environmental Quality regulations, Clean Water Act, Endangered Species Act and other applicable laws, policies and regulations. See other relevant laws and direction for more information.

Mt. Hood Land and Resource Management Plan (Forest Plan)

This DEIS is tiered to the Final Environmental Impact Statement (FEIS) and ROD for the Mt. Hood National Forest Land and Resource Management Plan (hereafter referred to as the Forest Plan) (USDA Forest Service 1990), as amended. The Forest Plan guides all natural resource management activities and establishes management standards and guidelines for the Forest. It describes resource management practices, levels of resource production and management, and the availability and suitability of lands for resource management. Additional management direction for the area is also provided in the following Forest Plan amendments:

- The Northwest Forest Plan (NWFP) – Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (USDA & USDI 1994);
- Mt. Hood Meadows Ski Area Master Plan – Record of Decision for Mt. Hood Meadows Ski Area Master Plan Final Environmental Impact Statement, including Forest Plan Amendment No. 10 (US Forest Service 1997);
- Survey and Manage – Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (US Forest Service et al. 2001); and,
- Invasive Plants – Pacific Northwest Invasive Plant Program Preventing and Managing Invasive Plants Record of Decision (US Forest Service 2005); and Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia Gorge Scenic Area in Oregon (US Forest Service 2008).

Survey and Manage

Survey protocols were followed for all action alternatives, as required by the Survey and Manage ROD. During these surveys, a mollusk (*Deroceras* spp.) was found in close proximity to the proposed Sunrise Vehicle Maintenance Shop proposed for Alternative 3. The required buffers for this species is 30 meters (approximately 98 feet), this would put the buffer line into the proposed maintenance shop footprint making the Sunrise Maintenance Shop for Alternative 3 infeasible. At this time, the scientific species of the mollusk is unknown and the specimen has been sent for genetic testing. If it is discovered that this species is *D.hesperium* (Category B, Survey and Manage species), this alternative shall not be implemented as required by the Survey and Manage

ROD. The ROD requires all known sites to be managed in order to protect the species (ROD, page 9-10). If it is discovered that this species is the common mollusk, Alternative 3 remains a viable alternative. If the results from the genetic testing have not determined the species when the decision is made for this project, it will be assumed that the mollusk is a Survey and Manage species and Alternative 3 shall not be selected by the Responsible Official.

Mt. Hood Meadows Ski Area Master Plan

In January 1997, the Forest Service issued the ROD for Mt. Hood Meadows Ski Area Master Plan Final Environmental Impact Statement (hereafter referred to as the Master Plan), including Forest Plan Amendment No. 10. The Master Plan was based on the analysis contained in the Mt. Hood Meadows Ski Area Master Plan Final Environmental Impact Statement (December 1990) and the Final Supplemental EIS (June 1996). The Master Plan defines the desired future condition for an expanded permit area; provides general direction for future development at MHM; and establishes winter sports design capacity and summer use maximum capacities. The approval for future development does not authorize specific facilities or uses, define the exact location of facilities, nor stipulate a timeline for development. Rather, it conceptually approves the number and approximate locations of lifts, additional ski terrain, base area expansions, other winter facilities and uses, access and service roads, and summer uses. Implementation, including this project, requires additional site-specific environmental analysis pursuant to requirements in the NEPA. The site-specific environmental analysis may supersede the management direction provided in the Master Plan. This DEIS is the site-specific NEPA required by the Master Plan.

Specific management direction from the Master Plan for this project includes the following.

- The existing Westside base is expanded by up to 9.5 acres to accommodate up to three acres for new maintenance facilities (page 9).

- Consider locating new maintenance facilities at the site of the existing administration building versus in the middle or lower portions of the expanded base area. This area offers several distinct advantages: it has previously been committed to development, provides easy access for grooming machines to ski slopes, and represents an opportunity to provide a small area for employee parking (page 10).

- A total of up to 8 acres of additional parking is authorized as part of the base area expansions. Storm water management and snow storage are included in, rather than in addition to, this total (page 10).

This document incorporates by reference the analysis and management direction contained in the Mt. Hood Meadows Ski Area Master Plan Final Environmental Impact Statement, Final Supplemental EIS, and Record of Decision (1997).

Best Management Practices

Best Management Practices (BMPs) are defined as "methods, measures or practices selected by an agency to meet its nonpoint source control needs. BMPs include, but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters" (EPA Water Quality Standards, Regulation, 40 CFR 130.2).

Appendix H of the Forest Plan provides management direction on the BMP implementation process. Appendix H states: "The general BMP's described herein are action initiating mechanisms which are for the development of detailed, site-specific BMP prescriptions to protect beneficial uses and meet water quality objectives. They are developed as part of the NEPA process, with interdisciplinary involvement by a team of individuals that represent several areas of professional knowledge, learning and/or skill appropriate for the issues and concerns identified. BMP's also include such requirements as Forest Service Manual direction, contract provisions, environmental documents, and Forest Plan Standards and Guidelines. Inherent in prescribing project-level management requirements is recognition of specific water quality objectives which BMP's are designed to achieve." Appendix H of the Forest Plan continues on to describe the implementation process and format for project specific BMP requirements.

According to the Northwest Forest Plan, BMPs would be incorporated into the implementation of the project. BMPs are drawn from General Water Quality Best Management Practices, Pacific Northwest Region (November 1988); Draft Environmental Protection Agency Region 10 Source Water Protection Best Management Practices for USFS, BLM (April 2005); Mt. Hood National Forest Standards and Guidelines, Northwest Forest Plan Standards and Guidelines and The National Best Management Practices for Water Quality Management on National Forest System Lands - Volume 1: National Core BMP Technical Guide (April 2012) and professional judgment. The BMPs have been adjusted and refined to fit local conditions and then incorporated in the project design criteria/mitigation measures as described in Section 2.2.3 as well as the standard contract language for implementing these projects. According to the USFS National Core BMP Technical Guide (April 2012) "Site-specific BMP prescriptions are developed based on the proposed activity, water quality objectives, soils, topography, geology, vegetation, climate, and other site-specific factors and are designed to avoid, minimize, or mitigate potential adverse impacts to soil, water quality, and riparian resources. State BMPs, regional Forest Service guidance, land management plan standards and guidelines, monitoring results, and professional judgment are all used to develop site-specific BMP prescriptions."

Appendix A of this DEIS details the site-specific Best Management Practices for Water Quality for this project. The appendix includes all the required components of the site-specific BMPs as specified in Appendix H of the Forest Plan, including BMP title, objective, explanation, ability to implement, effectiveness, and monitoring. In addition, the site-specific BMP table provides a cross-walk with the PDC and planning process. The refined BMPs selected for this project have been found to be implementable and effective based on prior field observations and professional judgment, other pertinent research described in Chapter 3 of this document, and monitoring on the Mt. Hood National Forest. These BMPs are fully analyzed in Chapter 3 of this document (see Section 3.4, Water Quality and Section 3.5, Aquatics).

Other Relevant Laws and Direction

National Environmental Policy Act

This DEIS has been prepared in accordance with regulations established under the National Environmental Policy Act of 1969.

Endangered Species Act

Section 7(a)(2) of the Endangered Species Act of 1973, as amended, requires federal agencies to review actions authorized, funded, or carried out by them, to ensure such actions do not jeopardize the continued existence of federally listed species, or result in the destruction or

adverse modification of listed critical habitat. For this project, no consultation was required with any of the regulatory agencies for aquatic species because there would be no effect to any ESA listed species. Formal consultation is required with US Fish and Wildlife Service for disturbance of Northern spotted owls (*Strix occidentalis caurina*) for this project. Consultation was completed as part of the programmatic consultation entitled "Biological Opinion and Conference Opinion Regarding the Effects of Habitat Modification Activities of Northern Spotted Owls (*Strix occidentalis caurina*) and its Critical Habitat, and Proposed Critical Habitat within the Willamette Province, FY 2013" (FWS Reference Number: 01EOFW00-2012-F-0158).

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996, requires federal action agencies to consult with the Secretary of Commerce (NMFS) regarding certain actions. Consultation is required for any action or Proposed Action authorized, funded, or undertaken by the agency that may adversely affect essential fish habitat (EFH) for species identified by the Federal Fishery Management Plans. For this project, there is no EFH present in the project area.

National Historic Preservation Act of 1966, Executive Order 11593, 36 CFR 800.9 (Protection of Historic Properties)

Section 106 requires documentation of a determination of whether each undertaking would affect historic properties. The Mt. Hood National Forest operates under a programmatic agreement between the Oregon State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation for consultation on project determination. Consultation with SHPO will be completed on this project before the ROD is signed by the Responsible Official.

Clean Water Act

The Clean Water Act of 1977 (CWA) and subsequent amendments established the basic structure of regulating discharges of pollutants into waters of the United States. The Environmental Protection Agency (EPA) has the authority to implement pollution control programs and to set water quality standards for all contaminants in surface waters. The EPA delegated implementation of the CWA to the States; the State of Oregon recognizes the Forest Service as the Designated Management Agency for meeting CWA requirements on National Forest System lands.

Federal Executive Order 11990 (Protection of Wetlands)

This executive order ended the official policy of federal assistance for wetlands conversion and directed all agencies to minimize wetland impacts in their regulations. Specifically, the Executive Order requires agencies "to avoid to the extent possible the long and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative." This project includes wetland mitigation, in accordance with this Executive Order.

1.3.2 Desired Future Condition

Based on the land allocation for this project, the desired future condition is to provide areas for high quality winter recreation (and associated summer) opportunities, including downhill skiing, within a natural appearing forest environment. The entirety of the project area is within A11-Winter Recreation Area land use allocation, as described by the Forest Plan (pages 4-190 thru 4-191). The major characteristics for the land use allocation (Forest Plan page 4-191) that this project would help to achieve include the following.

- High quality winter recreation activities, such as downhill skiing, nordic skiing, cross-country skiing, snowmobiling and snowplay.
- Winter recreation activities occur in a natural-appearing forest environment.
- Accessed by improved Forest Roads suitable for passenger cars

In addition, this project helps to achieve the desired future condition for winter function and uses as described in the Master Plan (ROD page 8-9). The components addressed through this project include:

- Maximize the potential of an expanded permit area as a day-use ski area;
- Target expansion of skier service to existing base areas to minimize adverse environmental impacts;
- Improve the quality of the recreational experience through expanded/upgraded facilities and access road improvements; and,

The Northwest Forest Plan land use allocations overlap with the land use allocations within the Forest Plan. This planning area includes Riparian Reserve and Administratively Withdrawn. Riparian Reserve includes areas along rivers, streams, wetlands, ponds, lakes, and unstable or potentially unstable areas where the conservation of aquatic and riparian-dependent terrestrial resources receives primary emphasis. Administratively Withdrawn allocations are identified areas in existing plans, including recreation/visual areas, back country and other areas not scheduled for timber harvest. The MHM permit area was identified as administratively withdrawn in the Master Plan, which amended the Forest Plan.

1.4. Proposed Action (Alternative 2)

In order to address the needs stated in Section 1.3, Alternative 2 proposes to build the Twilight Parking Lot and Sunrise Maintenance Shop (see Figure 1-2). Figure 1-3 is a map of the proposed parking lot including the connected actions, and Figure 1-4 is a map of the proposed maintenance building. In order to provide additional parking to serve current use and the design capacity that was conceptually approved in the ROD and Master Plan, a 7.2 acre parking lot for both downhill and Nordic customers at the Mt. Hood Meadows Ski Resort would be constructed. This new parking lot, referred to as the Twilight Parking Lot, would be located east of the Elk Meadows trailhead and west of the Oregon Department of Transportation (ODOT) sand shed with access via FSR 3545. In total, 9.4 acres would be cleared for this parking lot, snow storage, and a storm water facility. The overall parking capacity for MHM would be 3,526 vehicles, including the additional 878 vehicles from the Twilight Parking Lot.

Also, to improve parking capacity as well as customer safety, the vehicle maintenance functions would be moved away from the Mt. Hood Meadows Main Parking Lot and located on the north side of the existing Sunrise Parking Lot. The new Sunrise Vehicle Maintenance Shop would be approximately 65 by 150 feet in size and constructed on 1.75 acres. The existing shop would initially be used for storage. The existing generators and electrical distribution would remain

within the existing shop. It may be re-purposed for skier service in the future; however, this would potentially require additional site-specific NEPA depending on the proposed actions.

The Proposed Action also includes constructing the Twilight Parking Lot equipment maintenance yard (bus shop), constructing the associated access road, and constructing a Nordic guest services building. Lastly, the connected actions associated with this alternative are: installing utility lines (power, water, sewer and telephone) to service the new facilities; constructing left and right turn lanes from Highway 35 to FSR 3545; restoring an impacted wetland; and, constructing Nordic ski trails. Each of these actions is described more fully in Section 2.2.2.

Overall, the Proposed Action would impact 17.6 acres of A11 lands within the Mt. Hood Meadows Ski Resort permit area, plus an additional 0.5 acres along Highway 35. This includes the acres of disturbance associated with the Twilight Parking Lot, Sunrise Maintenance Building, Twilight Parking Lot equipment maintenance yard (bus shop), utility lines, access road, and Nordic ski trail construction.

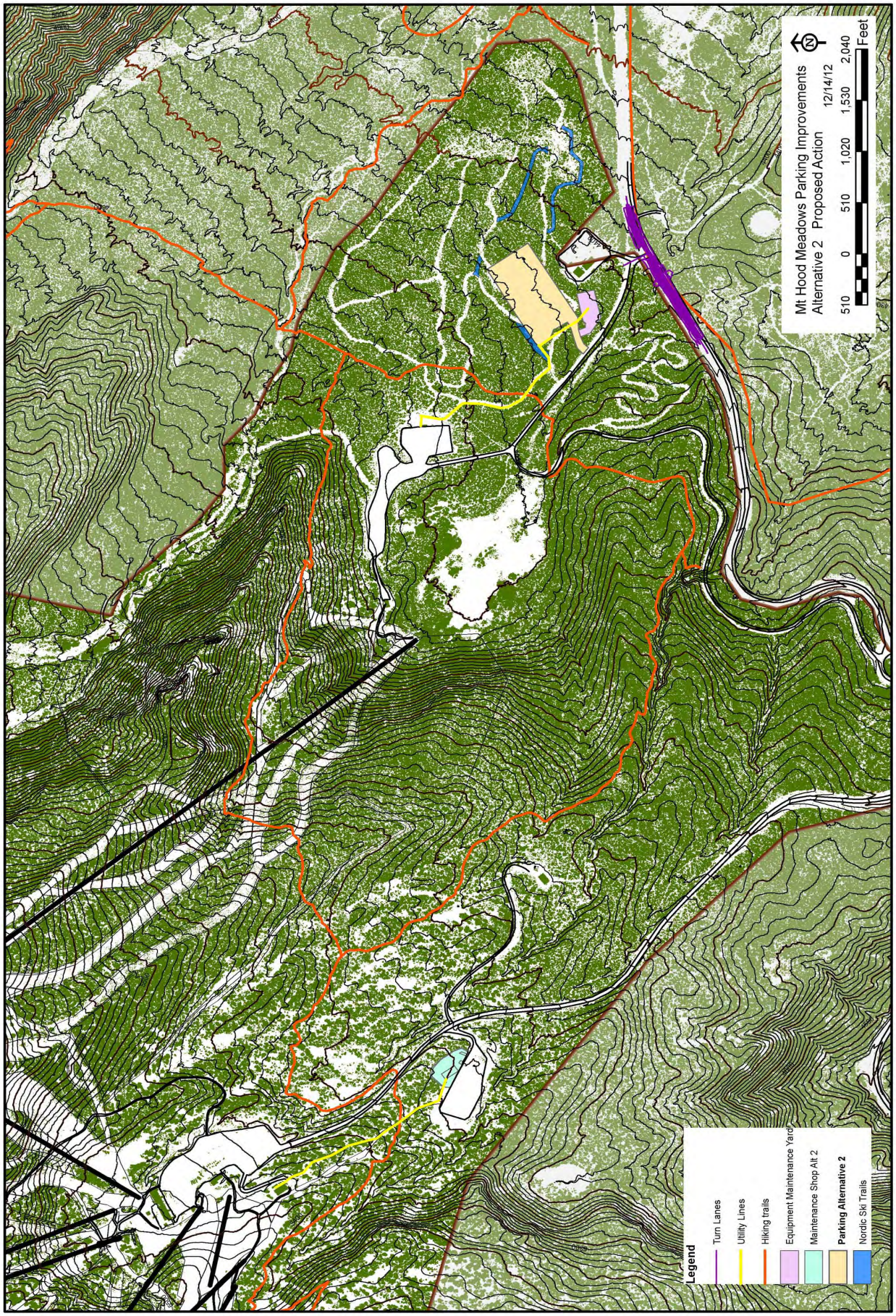

Figure 1-2: Overview Map for Alternative 2 – Proposed Action

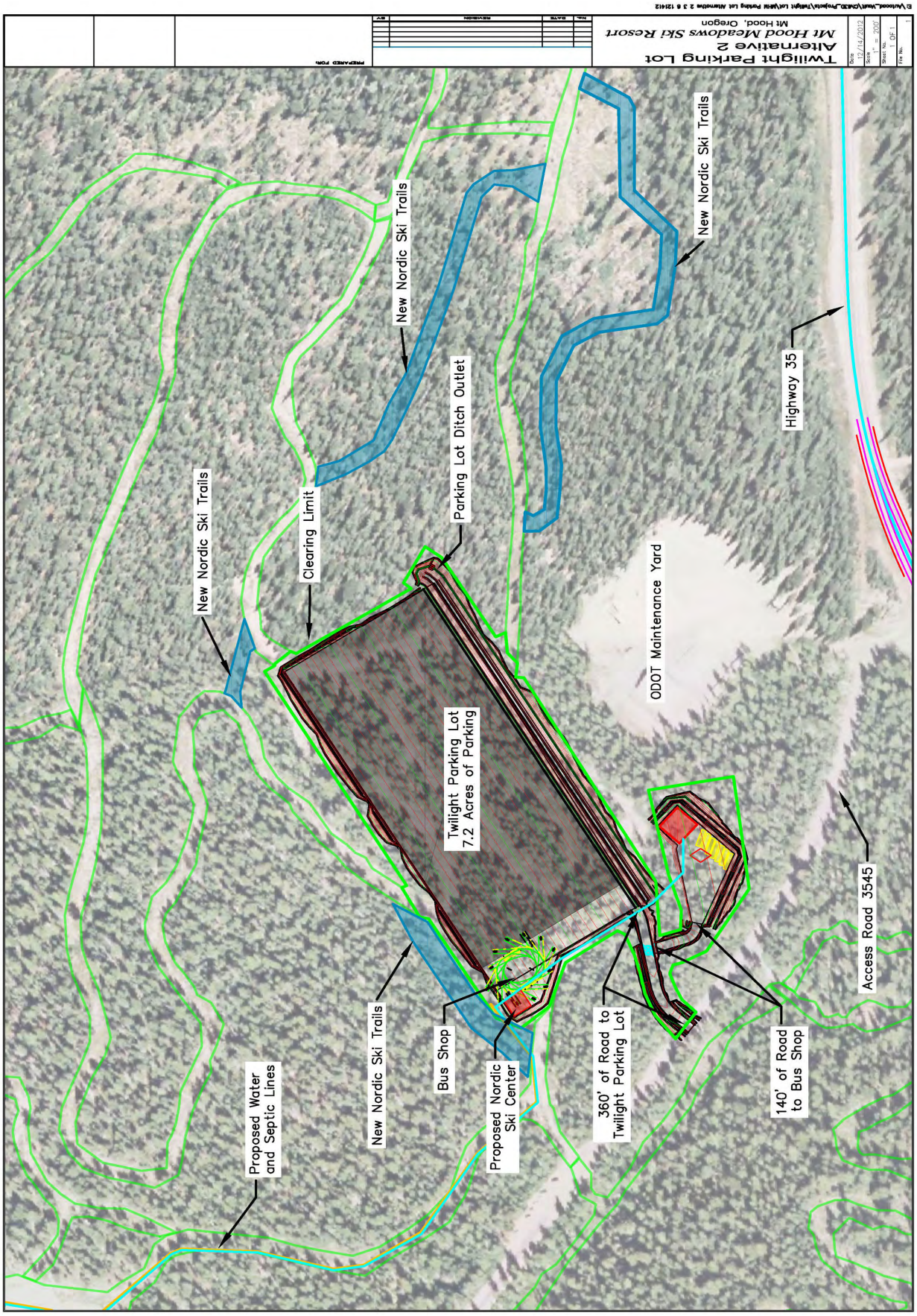

Figure 1-3: Alternative 2, Twilight Parking Lot

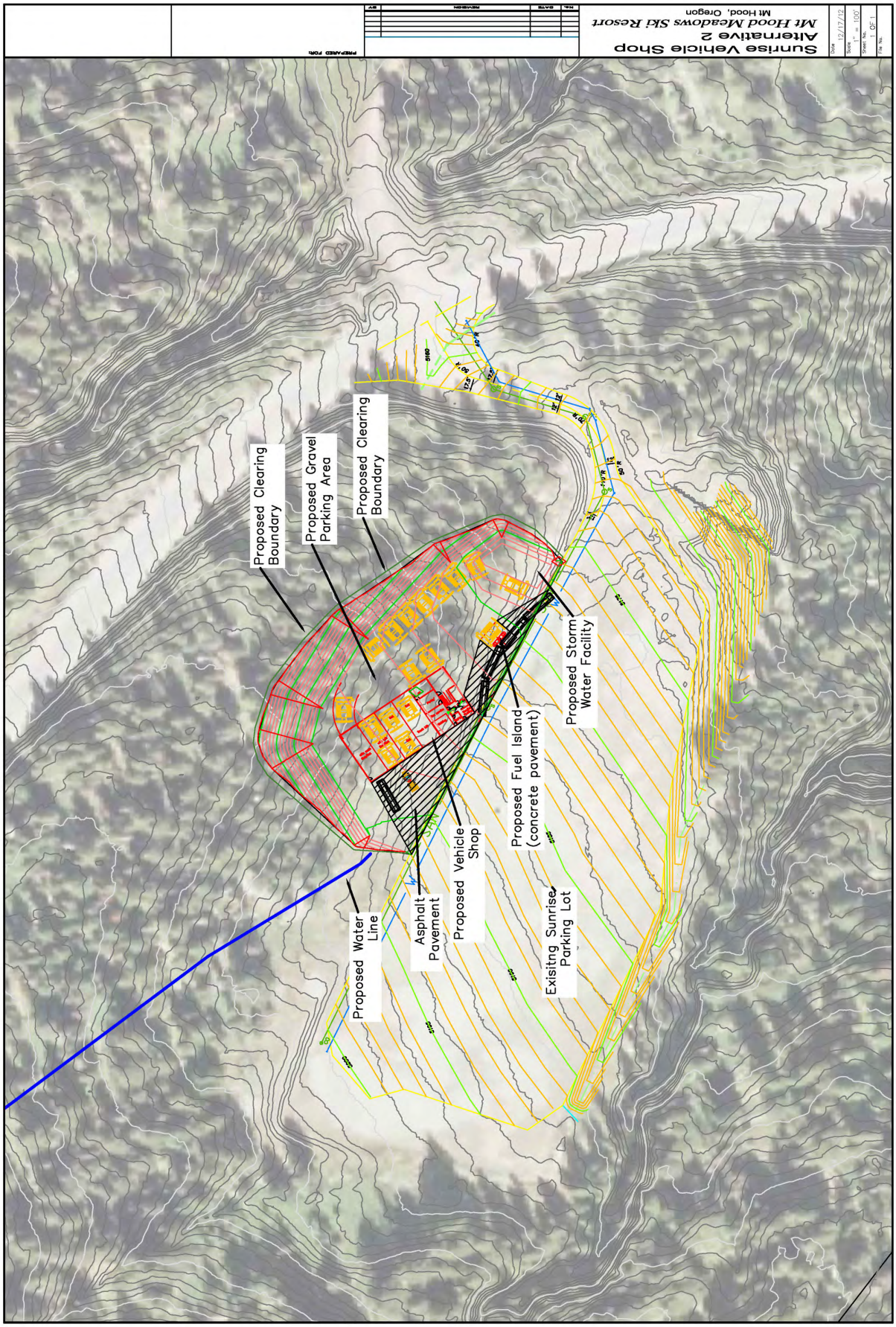

Figure 1-4: Alternative 2, Sunrise Vehicle Maintenance Shop

Master Plan Consistency

This alternative is inconsistent with the MHM Master Plan. The proposed Twilight Parking Lot is 9.4 acres, including storm water management and snow storage, rather than 8 acres as described on page 10 of the ROD. In addition, the Twilight equipment maintenance yard (bus shop) includes another 3.1 acres of clearing. The total clearing associated with this alternative is 12.5 acres. As such, the Twilight Parking Lot is not consistent with the Master Plan.

The Sunrise Maintenance Shop is less than the 3 acres described in the ROD on page 9, but it is not in the recommended location described on page 10. Although the recommended location was considered, it was not selected as part of the Proposed Action in order to minimize the acres of disturbance associated with the new building by co-locating it adjacent to the Sunrise Parking Lot. Also, the recommended location is in close proximity to wetlands and Riparian Reserves. Lastly, the recommended location was determined not to be favorable for the movement of snow cats during low snow levels due to the distance of travel. The ROD (page 10) does allow other locations to be considered, but notes that the advantages to the recommended site are: "it has been previously committed to development, provides easy access for grooming machines to the ski slopes, and represents an opportunity to provide a small area for employee parking." The selected location does utilize an area previously committed to development and provides easy access for grooming machines to the ski slopes, plus it minimizes the environmental impacts. As such, the maintenance shop is consistent with the Master Plan ROD.

If this alternative is selected by the Responsible Official, the Final EIS would supersede the related management direction and recommendations provided in the ROD related to the parking lot expansion for Mt. Hood Meadows Ski Area Master Plan Final Environmental Impact Statement, including Forest Plan Amendment No. 10 (January 1997).

1.5. Decision Framework

The District Ranger for the Hood River Ranger District on the Mt. Hood National Forest is the Responsible Official for this project. Given the purpose and need, the District Ranger will review the Proposed Action, alternatives, environmental consequences, and public comments in order to make the following decisions:

- Would this project be implemented as proposed, as modified by an alternative, or not at all?

- If the project is implemented, the District Ranger would need to decide the following:

  ✓ Where would the new Twilight Parking Lot and Sunrise Maintenance Facilities be located within the MHM permit area?
  ✓ How much parking capacity in acres and vehicles would be added?
  ✓ Would all the related and connected actions be implemented as described?
  ✓ What Project Design Criteria/Mitigation Measures (PDC) and monitoring requirements would the Forest Service apply?

Factors influencing the selection of an alternative include:

- How well the alternative meets the purpose and need for action;
- Potential effects of constructing a parking lot and building a maintenance facility as well as the effects of implementing the related and connected actions to the environment;
- Consistency with the Forest Plan, as amended, and consistency with the 1997 ROD for the Mt. Hood Meadows Ski Area Master Plan while also minimizing environmental impact; and,
- Balancing the winter recreation opportunities within the Mt. Hood Meadows Ski Resort permit area.

1.6. Public Involvement

Public involvement has occurred throughout the NEPA process. The project was included in the quarterly Schedule of Proposed Actions distributed by the Forest since April 2010. Information on the proposal was posted on a project website (http://www.fs.fed.us/nepa/fs-usda-pop.php/?project=26954) beginning at that time.

A Notice of Intent (NOI) requesting public comment was published in the Federal Register (Vol. 76, No. 131) on July 8, 2011. A scoping letter was mailed to approximately 70 individuals, organizations, agencies, businesses, recreational residence owners, and local and tribal governments in July 2011. The Forest Service received approximately 28 comments through this process. The comments were from a variety of organizations and individuals, including ski associations (Pacific Northwest Ski Areas Association and NW Ski Club Council); environmental organizations (Bark and Crag Law Center); non-profit organizations (Friends of Mt. Hood and Mount Hood National Park Campaign); federal, state and local government agencies (National Park Service, Environmental Protection Agency and Oregon Department of Transportation); tribal government (Confederated Tribes of Warm Springs); and 17 individuals.

A trip field was held at the Mt. Hood Meadows Ski Resort on September 28, 2012 to review options on-the-ground. Sixteen individuals attended the field trip in addition to Forest Service personnel. The individuals represented environmental groups (Oregon Wild); non-profit organizations (Mazamas and Friends of Mt. Hood); ski organizations (Oregon Nordic Club and Mt. Hood Meadows); and individuals.

All scoping comments and mailing lists are available in the project file, located in the Hood River District Ranger's Office in Mount Hood/Parkdale, Oregon. The distribution list for this Draft EIS can be found in Chapter 4.

1.7. Issues

NEPA directs federal agencies to focus analysis and documentation of significant issues related to the Proposed Action. The scoping process resulted in the identification of some potential issues to be addressed in the EIS. An "issue" arises from the relationships between actions (proposed, connected, similar, cumulative) and environmental consequences (physical, biological, cultural,

and socioeconomic). In this EIS, issues are defined as points of discussion, debate, or dispute about the environmental effects of the Proposed Action. The issues are divided into three groups: key, resolved, and tracking issues.

In addition, issues outside the scope of this analysis were identified. The Council of Environmental Quality requires the Forest Service to identify and eliminate from detailed study issues that are not significant (40 CFR 1501.7). Issues may be eliminated from further analysis when the issue is outside the scope of the EIS; are already decided by law, regulation, Forest Plan, or other higher level decision; are not clearly relevant to the decision to be made; or are conjectural and not supported by scientific or factual evidence. Issues outside the scope of this project are available in the project file, located in the Hood River District Ranger's Office in Mt. Hood/Parkdale, Oregon.

1.7.1. Issues

Issues are those that are within the scope of the Proposed Action and suggest the need to consider different actions or project design criteria. Issues as used in this DEIS are those that are used to formulate alternatives, affect the design of alternative components, prescribe PDC, or describe environmental effects. Issues are identified as such due to their geographic distribution, duration of effects, intensity of interest by the public, or resource area conflict. Alternative 3 (New Nordic Trails), Alternative 4 (Elk Meadow Master Plan), Alternative 5 (Elk Meadow) and Alternative 6 (Preferred Alternative) were designed to address the issues. The Forest Service identified two issues.

- ▹ Master Plan Consistency
- ▹ Nordic Skiing

Brief summaries of each issue are presented below.

Issue 1: Master Plan Consistency

The Proposed Action (Alternative 2) is inconsistent with the Master Plan. The Master Plan defines the desired future condition for an expanded permit area; provides general direction for future development at MHM; and establishes winter sports design capacity and summer use maximum capacities. Some members of the public believe these inconsistencies cause an imbalance between developed recreation with other ecological services and other uses in the permit area. The proposed alternatives vary in how well they adhere to the Master Plan. Specific concerns expressed by the public include:

- The Forest Service must rigorously explore the purpose and need for the proposed parking expansion. The proposed project would expand parking facilities well beyond what was conceptually approved in the 1997 Master Plan by creating a total disturbed area of 12.5 acres, as opposed to the 8 acres set forth in the Record of Decision.

- The Forest Service must clearly articulate and disclose to the public any data supporting a need to expand parking well beyond the Master Plan limitations to serve 13,900 persons at one time (PAOT). The Forest Service should also disclose whether MHM could accom-

modate more than the 13,900 PAOT with the requested parking infrastructure, which would appear to be an unauthorized expansion of the PAOT in disregard of the Master Plan limitations.

- The Master Planning process may quickly become irrelevant if the agency disregards the specific limitations and conditions set forth in the Master Plan, which were developed following many years of public involvement, when approving subsequent site specific projects.

Measures for Comparing Alternatives

- Consistency with Master Plan ROD
- Parking capacity stated in the Master Plan ROD

Discussion of the issue can be found in Sections 2.2 and 3.1. Section 2.2, Alternatives discusses the consistency of each alternative with the Master Plan ROD. Section 3.1, Recreation discusses the packing capacity.

Issue 2: Nordic Skiing

The Proposed Action (Alternative 2) eliminates some miles of Nordic skiing opportunities within the MHM permit area. Some members of the public believe that the replacement ski trails should not be considered in-kind replacement trails. They also believe that the replacement trails substantially change the quality of the ski experience. Specific concerns expressed by the public include:

- The architecture, path and terrain of the trails to be removed are the very best trail features of the Meadows Nordic trail system. The existing and remaining trails to the east are of very poor design. Long, straight downhill segments lacking undulating elevation make for silly and uninspired "highways" in the best of snow conditions and stupid, fast, and dangerous speed control challenges in firm snow or icy conditions.

- It will be pointed out by many, of course, that the plan calls for paving over some of the most popular trails of the system – the Hanel and Little loops – whose friendly contours are particularly appealing to beginning skiers, and provide good, fun warm-up laps for the more experienced or fit.

- Not only would it do nothing to address some of the current shortcomings of the (dis) connection – the single crossing, the section parallel to the road that gets sprayed with gravel from snow removal equipment– it would inevitably make it far worse.

Measures for Comparing Alternatives

- Difficulty Rating (Easiest, Intermediate and Most Difficult)
- Description of Experience

Discussion of the issue can be found in Section 3.1, Recreation.

1.7.2. Other Concerns

Other concerns are those that have been determined to be relevant, but are not used to formulate alternatives. These concerns often describe minor or consistent consequences among alternatives considered in detail. 'Minor' for this analysis means that the effects to the resource were negligible and did not drive an alternative. These concerns usually are addressed through adherence to standards and guidelines, appropriate laws and regulations, or as covered by the PDC. These concerns are generally of interest or concern to the public, and are tracked throughout the document.

Water Quality and Quantity

The construction of the action alternatives can affect water quality and quantity in two primary ways: 1) direct delivery of pollutants such as sediment through runoff from construction activities; and 2) indirect delivery of pollutants and increased water quantity through runoff from new impervious surfaces such as the parking lot and maintenance facility. In addition, project activities within riparian areas have a higher risk of sediment and, where they parallel streams can permanently remove riparian vegetation and the floodplain. Project Design Criteria, such as utilizing storm water runoff treatment and construction erosion control, would help to mitigate the potential impacts to surface water quality and quantity.

Measures for Comparing Alternatives

- Total Percentage of Sub-watershed in Impervious Surfaces
- Acres of Riparian Reserve Disturbed
- Overall Impact

This concern will be addressed by working towards implementing Forest Plan as amended by the Northwest Forest Plan standards and guidelines within riparian areas, implementing standards and guidelines associated with the Master Plan, and meeting the Clean Water Act requirements.

Huckleberry Removal

There is concern that new facilities in the project area would result in the loss of huckleberry habitat. Huckleberries are protected in The Confederated Tribes of Warm Springs (CTWS) off-reservation gathering rights in this 'usual and accustomed' place. Removal of some of the forest canopy has a beneficial effect on the huckleberries as the sunlight is able to better get to the plants on the forest floor. Permanently removing huckleberry habitat with permanent pavement, access roads, and ski trails may impact the cultural resources upon which CTWS depend.

Measure for Comparing Alternatives

- Acres of huckleberry plants permanently eliminated

This concern will be discussed through government-to-government consultation with the CTWS. The level of "acceptance" for huckleberry plants permanently eliminated will be determined through the consultation process with the CTWS.

Spotted Owl Suitable Habitat

Within the home range of the northern spotted owl in the project area, there is approximately 10 percent of suitable habitat classified. There is concern that new facilities within the project area could remove the amount of suitable habitat available for spotted owls.

Measure for Comparing Alternatives

- Acres of Suitable Habitat Removed

There is a significant amount of dispersal/ high quality foraging (or suitable habitat without nesting structure) habitat in the home range, which is contributing to the suitable habitat deficiency and viability of the owl site. After field review, dispersal habitat was changed to suitable without nesting structure, contributing about 40 percent more suitable habitat to the home range of this pair. If nesting, roosting, and foraging habitat is removed to an extent that lowers the amount of suitable habitat cover within an owl home range area to below 40%, then the resulting effects determination could be “likely to adversely affect” and may cause “take” of the spotted owl based on consultation with US Fish and Wildlife Service.

Chapter 2 - Alternatives, including the Proposed Action

2.0. Alternatives, including the Proposed Action

Chapter 2 describes and compares the alternatives considered for improving public and customer safety by increasing parking capacity and improving traffic flow at Mt. Hood Meadows Ski Resort. A description and map are provided for each alternative considered in detail. Also, this section presents the alternatives in comparison form, highlighting the differences between each alternative and providing a basis for choice among options for the Responsible Official and the public. The Responsible Official for this project is the District Ranger for the Hood River Ranger District of the Mt. Hood National Forest.

2.1. Alternative Development Process

The interdisciplinary team (IDT), including the Responsible Official, followed the Forest Service Handbook (1909.15) for developing and considering alternatives. Alternatives were developed to meet the purpose and need and to respond to public issues.

Alternative 2, the Proposed Action, was developed in response to proposals submitted by Mt. Hood Meadows Ski Resort (MHM) in March 2009 and April 2011. In 2009, MHM requested the Forest Service consider a proposal to build a new parking lot east of Elk Meadows trailhead and west of the Oregon Department of Transportation sand shed with access via Forest Service Road (FSR) 3545. Additional parking was authorized by the Forest Service in the Record of Decision (ROD) for Mt. Hood Meadows Ski Area Master Plan Final Environmental Impact Statement (Master Plan), including Forest Plan Amendment No. 10 (ROD p. 10).

In addition to the new parking lot, MHM requested the Forest Service to consider their proposal to move and upgrade the vehicle maintenance building in 2011. The Master Plan authorized a three acre expansion on the Westside Base for new maintenance facilities (ROD p. 9). The Master Plan recommends that MHM consider locating the new maintenance facilities at the site of the existing administration building because it has previously been committed to development, provides easy access for grooming machines to ski slopes, and represents an opportunity to provide a small area for employee parking (ROD p. 10). MHM considered this location, but determined it would not be favorable for the movement of snow cats during low snow levels (early and late season) and because of the distance of travel. MHM suggested an alternative location next to the Sunrise Parking Lot, which meets the first two recommendations stated in the Master Plan (i.e., previously been committed to development and provides easy access for grooming machines to ski slopes).

In total, the Forest Service developed six alternatives: No Action (Alternative 1), Proposed Action (Alternative 2), and four other action Alternatives (Alternatives 3, 4, 5 and 6). The No Action (Alternative 1) is defined as the current condition and was compared to the underlying need for action. As discussed above, Alternative 2 was developed in response to a proposal from MHM. Alternatives 3, 4, 5, and 6 were developed based on public and agency issues and concerns.

Alternatives 3 and 4 were designed to address Issue 1: Master Plan Consistency as well as Issue 2: Nordic Skiing (see Section 1.7.1). Alternative 3 was altered from Alternative 2 in order to create a similar Nordic skiing experience as the existing conditions. Alternative 4 was designed to be fully consistent with the Master Plan. This alternative also moves the proposed parking lot location to

minimize impacts to the existing Nordic ski trails. Alternative 5 addresses Issue 2 by moving the proposed parking lot location, but it more closely resembles the initial proposals submitted by MHM in overall parking capacity. Lastly, Alternative 6 was developed as the Preferred Alternative after considering public involvement as well as the environmental consequences discussed in Chapter 3. The alternatives are discussed in more detail in the following section.

Some alternatives that would resolve public concerns were eliminated from detailed study because they do not meet the purpose and need for action, were not reasonably feasible or viable, were duplicative of the alternatives considered in detail, or were determined to cause unnecessary environmental harm. The eliminated alternatives are discussed in Section 2.6.

2.2. Alternatives Considered in Detail

2.2.1 Alternative 1 – No Action Alternative

The Alternative 1 – No Action Alternative represents the current conditions. In this alternative, none of the proposed parking improvements or connected actions associated with the Mt. Hood Meadows Parking Improvements Project would be constructed. On peak days and weekends, there would continue to be inadequate parking capacity at MHM. Parking capacity of MHM would remain unchanged at 2,647 vehicles. Winter recreationists accessing MHM would continue to park along access roads to both the Main Parking Lot (FSR 3555) and to the Hood Meadows Parking Lot (FSR 3545), Highway 35, as well as Sno-Parks located near the Nordic ski trails along Highway 35. Traffic congestion would continue to exist due to northbound traffic on Highway 35 waiting for people to park along the Hood River Meadows access road (FSR 3545) and southbound traffic waiting to turn across the southbound lane onto the access road. Congestion created by the traffic would continue to limit access by emergency vehicles. Also, continued parking along the access roads and highway would continue to be unsafe for skiers walking along the roads to get to the shuttle bus pick-up locations. The industrial bus parking and vehicle maintenance functions would continue to be co-located with the Mt. Hood Meadows Main Parking Lot. The industrial buses would continue to be parked and serviced outside the maintenance facilities. Combining the industrial bus parking and vehicle maintenance functions with the public areas at the Main Parking Lot would continue to present safety concerns related to traffic flow and the maintenance activities outside the facilities. Also, the location of the current maintenance shop would continue to decrease potential parking capacity at the Main Parking lot.

2.2.2 Alternative 2 – Proposed Action

In order to address the needs stated in Section 1.3, Alternative 2 proposes to build the Twilight Parking Lot and Sunrise Maintenance Shop (see Figure 1-2). Figure 1-3 is a map of the proposed parking lot including the connected actions, and Figure 1-4 is a map of the proposed maintenance shop. In order to provide additional parking to serve current use and the design capacity that was conceptually approved in the ROD and Master Plan, a 7.2 acre parking lot for both downhill and Nordic customers would be constructed. This new parking lot, referred to as the Twilight Parking Lot, would be located east of the Elk Meadows trailhead and west of the Oregon Department of Transportation (ODOT) sand shed with access via FSR 3545. In total, 9.4 acres would be cleared for this parking lot, snow storage, and a storm water facility. The overall parking capacity for MHM would be 3,526 vehicles, including the additional 878 vehicles from the Twilight Parking Lot.

Also, to improve parking capacity as well as customer safety, the vehicle maintenance functions would be moved away from the Mt. Hood Meadows Main Parking Lot and located on the north side of the existing Sunrise Parking Lot. The new Sunrise Vehicle Maintenance Shop would be approximately 65 by 150 feet in size and constructed on 1.75 acres. No new access road is needed at this site. The existing shop would initially be used for storage. The existing generators and electrical distribution would remain within the existing shop. It may be re-purposed for skier service in the future; however, this would potentially require additional site-specific NEPA depending on the proposed actions.

Additionally, in order to accomplish the activities proposed above, the Proposed Action includes the following.

- Twilight Parking Lot Equipment Maintenance Yard (Bus Shop) – An additional 2.9 acres would be cleared for an equipment maintenance yard, which would include bus and snow equipment parking and a maintenance building. The bus shop would be co-located with the Twilight Parking Lot.

- Access Roads – Two access roads (approximately 500 feet or 0.9 acres) would be constructed. One access road would lead to the Twilight Parking Lot Equipment Maintenance Yard (140 feet) and the other to the Twilight Parking Lot (360 feet).

- Nordic Guest Services Building – In order to serve both downhill and Nordic skiers, a guest services building would be constructed within the Twilight Parking Lot area. The services to be included are: bathrooms, lockers, food and beverage services, guest seating, Nordic equipment rental, and a covered bus stop. The approximate dimension of the guest services building would be 35 by 60 feet.

  At this time, there are no firm plans for the existing modular building: 1) it could remain in place for the near term; 2) the bathroom could be used by guests who park nearby; or 3) the building is portable so it could be moved to another location or off-site in the future. If the building is moved, site-specific NEPA would be completed, if required.

Lastly, there are several connected actions associated with these proposals. Actions are connected if they: (i) automatically trigger other actions which may require environmental impact statements; (ii) cannot or will not proceed unless other actions are taken previously or simultaneously; or (iii) are interdependent parts of a larger action and depend on the larger action for their justification. The connected actions for this alternative are listed below.

- Utility Lines (power, water, sewer and telephone) – Utility lines would be buried under an existing Nordic trail from the current Nordic Center to the Twilight Lot in two 36-inch deep trenches separated by at least 10-feet following existing clearings. A 1,750-foot water line would also be buried into the same corridor as an existing power line from the Administrative Building and shorter sewer line extended into the Sunrise Lot.

- Turn Lanes – In order to improve public and customer safety (traffic flow) on Highway 35 and FSR 3545, left- and right-turn lanes with adequate vehicle storage for northbound and southbound traffic at the intersection of the highway and access road would be construct-

ed. Construction of the turn lanes would impact 3.3 acres, which includes 0.5 acres of new disturbance and 2.8 acres of disturbance within the existing road prism for Highway 35.

- Wetland Relocation – The proposed right turn lane would remove less than an acre of wetlands located immediately adjacent to Highway 35. It appears this wetland was formed partially by interception of groundwater by construction of the ditchline and snowmelt runoff from the forested area to the north. To mitigate this loss of wetland, a new wetland of equal or greater size would be created in approximately the same location relative to the newly constructed right-turn lane. As a result, there would be no net loss in wetlands.

- Nordic Ski Trails – The proposed Twilight Parking Lot would remove approximately one-half mile (or 2,746 feet) of Nordic ski trails from the Hanel and Little Loops. This alternative would replace these trails as a connected action as shown in Figure 1-3. All new Nordic trails would be 25-foot clearings with an additional 8 feet of thinning on either side of the trail to allow for snow accumulation. The additional 8 feet would be thinned to 30 percent canopy closure in order to encourage huckleberry production. The total width of disturbance for the Nordic trails would be 41 feet. In addition, all of the existing Nordic trails would be planted with native species in order to narrow the trails and meet these same design features.

- Sahalie Falls Trail (Forest Service Trail #667c) would not be impacted by this alternative.

Overall, the Proposed Action would impact 17.6 acres of A11 lands (Winter Recreation Area) within the Mt. Hood Meadows Ski Resort permit, plus an additional 0.5 acres along Highway 35. This includes the acres of disturbance associated with the Twilight Parking Lot, Sunrise Maintenance Building, Twilight Parking Lot Equipment Maintenance Yard (Bus Shop), utility lines, access roads, and Nordic ski trail construction.

Master Plan Consistency

This alternative is inconsistent with the MHM Master Plan. The proposed Twilight Parking Lot is 9.4 acres including storm water management and snow storage, rather than 8 acres as described on page 10 of the ROD. In addition, the Twilight Equipment Maintenance Yard (Bus Shop) includes another 2.9 acres of clearing. The total clearing associated with this alternative is 12.3 acres. As such, the Twilight Parking Lot is not consistent with the Master Plan.

The Sunrise Maintenance Shop is less than the 3 acres described in the ROD on page 9, but it is not in the recommended location described on page 10. Although the recommended location was considered, it was not selected in order to minimize the acres of disturbance associated with the new building by co-locating it adjacent to the Sunrise Parking Lot. Also, the recommended location is in close proximity to wetlands and Riparian Reserves. Lastly, the recommended location was determined not to be favorable for the movement of snow cats during low snow levels due to the distance of travel. The ROD does allow other locations to be considered, but notes that the advantages to the recommended site are: "it has been previously committed to development, provides easy access for grooming machines to the ski slopes, and represents an opportunity to provide a small area for employee parking." The selected location does utilize an area previously committed to development and provides easy access for grooming machines to the ski slopes, plus it minimizes the impacts to wetlands and Riparian Reserves. As such, the maintenance shop is consistent with the Master Plan ROD.

If this alternative is selected by the Responsible Official, this EIS would supersede the related management direction and recommendations provided in the ROD related to the parking lot expansion for Mt. Hood Meadows Ski Area Master Plan Final Environmental Impact Statement, including Forest Plan Amendment No. 10 (January 1997).

2.2.3 Alternative 3 – New Nordic Trails

Alternative 3 was designed to fully address Issue 2: Nordic Skiing and partially address Issue 1: Master Plan Consistency. The Nordic ski trails were designed to create a similar skiing experience as the existing conditions. Alternative 3 moves the proposed Sunrise Vehicle Maintenance Shop to the location recommended in the Master Plan. Alternative 3 does not fully address Issue 1 because the overall size of the parking lot is not decreased. Figure 2-1 is an overview map for this alternative

Figure 2-2 is a map of the proposed parking lot including the connected actions, and Figure 2-3 is a map of the proposed maintenance building. This alternative includes the construction of 7.5 additional acres of parking for both downhill and Nordic customers at the Mt. Hood Meadows Ski Resort. The Twilight Parking Lot would be in the same location as Alternative 2. This parking lot, however, does not have linear edges in order to reduce the visual impacts associated with the new parking lot. In total, 13.8 acres would be cleared for this parking lot, snow storage, and a storm water facility. The overall parking capacity for MHM would be 3,526 vehicles, including the additional 878 vehicles from the Twilight Parking Lot.

Additionally, in order to accomplish the activities proposed above, this alternative includes the following.

- Twilight Parking Lot Equipment Maintenance Yard (Bus Shop) – The construction of the bus shop is the same as Alternative 2. A total of 2.9 acres would be cleared for an equipment maintenance yard.

- Access Roads – Two access roads (approximately 470 feet or 0.8 acres) would be constructed. One access road would lead to the Twilight Parking Lot Equipment Maintenance Yard (140 feet) and the other to the Twilight Parking Lot (330 feet).

- Nordic Guest Services Building – The guest service building would remain the same as Alternative 2.

Lastly, the connected actions associated with this alternative are listed below.

- Utility Lines (power, water, sewer and telephone) – The construction of the utility lines would be the same as Alternative 2.

- Turn Lanes – The construction of the turn lanes would be the same as Alternative 2.

- Wetland Relocation – The relocation of the wetland would be the same as Alternative 2.

- Nordic Ski Trails –The proposed Twilight Parking Lot would remove approximately 0.7 mile (or 3,432 feet) of Nordic ski trails from the Hanel, Bear Grass and Little Loops. This alternative would replace these trails as a connected action as shown in Figure 2-2. All new Nordic trails would be 25-foot clearings with an additional 8 feet of thinning on either side of the trail to allow for snow accumulation. The additional 8 feet would be thinned to 30 percent canopy closure in order to encourage huckleberry production. The total width of disturbance for the Nordic trails would be 41 feet. In addition, all of the existing Nordic trails would be planted with native species in order to narrow the trails and meet these same design features.

- Sahalie Falls Trail (Forest Service Trail #667c) would not be impacted by this alternative.

Overall, Alternative 3 would impact 24.2 acres of A11 lands (Winter Recreation Area) within the Mt. Hood Meadows Ski Resort permit area, plus as additional 0.5 acres along Highway 35. This includes the acres of disturbance associated with the Twilight Parking Lot, Sunrise Maintenance Building, Twilight Parking Lot Equipment Maintenance Yard (Bus Shop), utility lines, access roads, and Nordic ski trail construction.

Master Plan Consistency

This alternative is inconsistent with the MHM Master Plan. The proposed Twilight Parking Lot is 13.8 acres including storm water management and snow storage, rather than 8 acres as described on page 10 of the ROD. In addition, the Twilight Equipment Maintenance Yard (Bus Shop) includes another 3.1 acres of clearing. The total clearing associated with this alternative is 16.9 acres. As such, the Twilight Parking Lot is not consistent with the Master Plan. The Sunrise Vehicle Maintenance Shop, however, is consistent with the Master Plan ROD. The maintenance shop is less than the 3 acres and in the recommended location as described in the ROD on pages 9 and 10. If this alternative is selected by the Responsible Official, this EIS would supersede the related management direction and recommendations provided in the ROD related to the parking lot expansion for Mt. Hood Meadows Ski Area Master Plan Final Environmental Impact Statement, including Forest Plan Amendment No. 10 (January 1997).

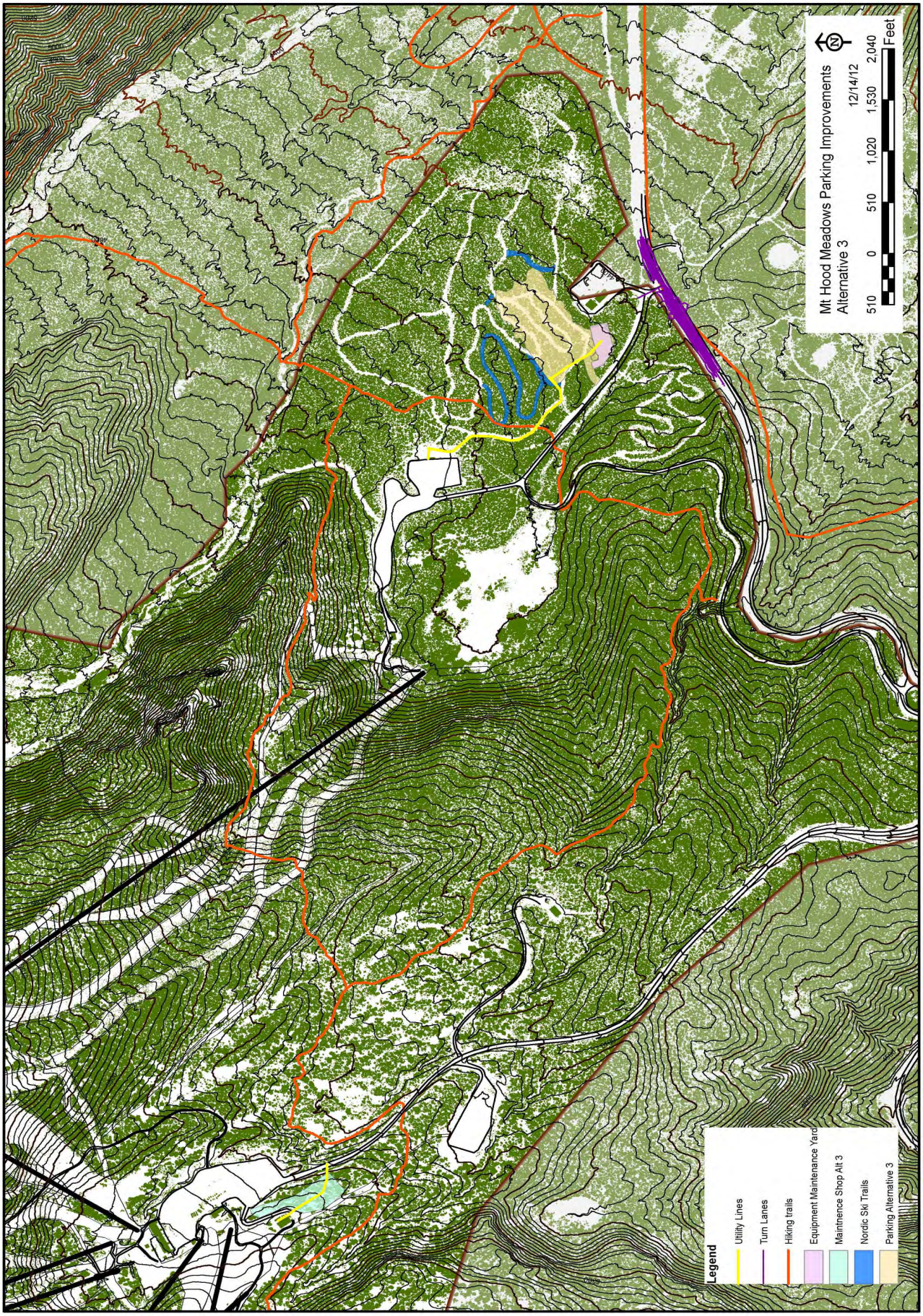

Figure 2-1: Overview Map for Alternative 3 – New Nordic Trails

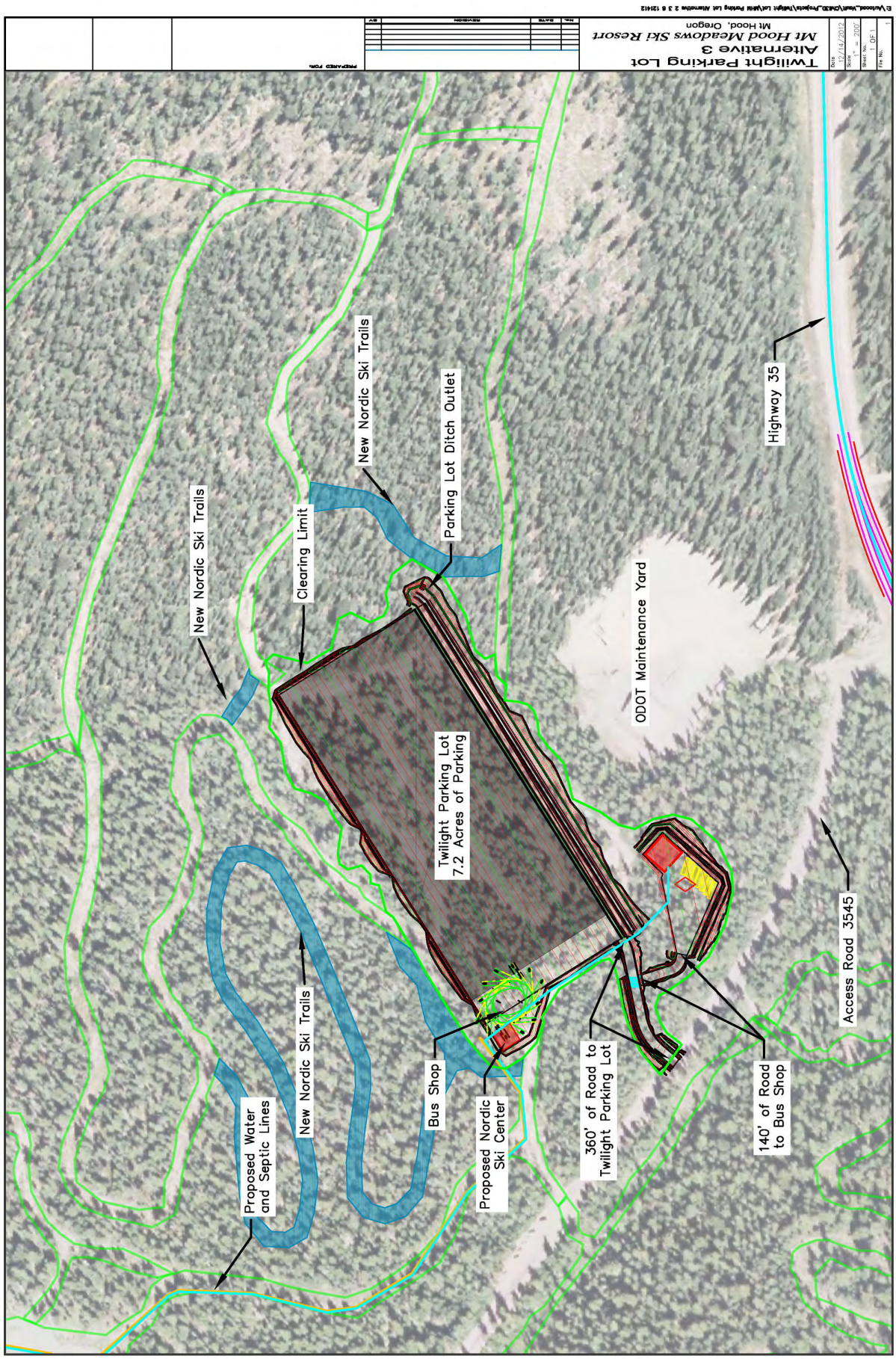

Figure 2-2: Alternative 3, Twilight Parking Lot

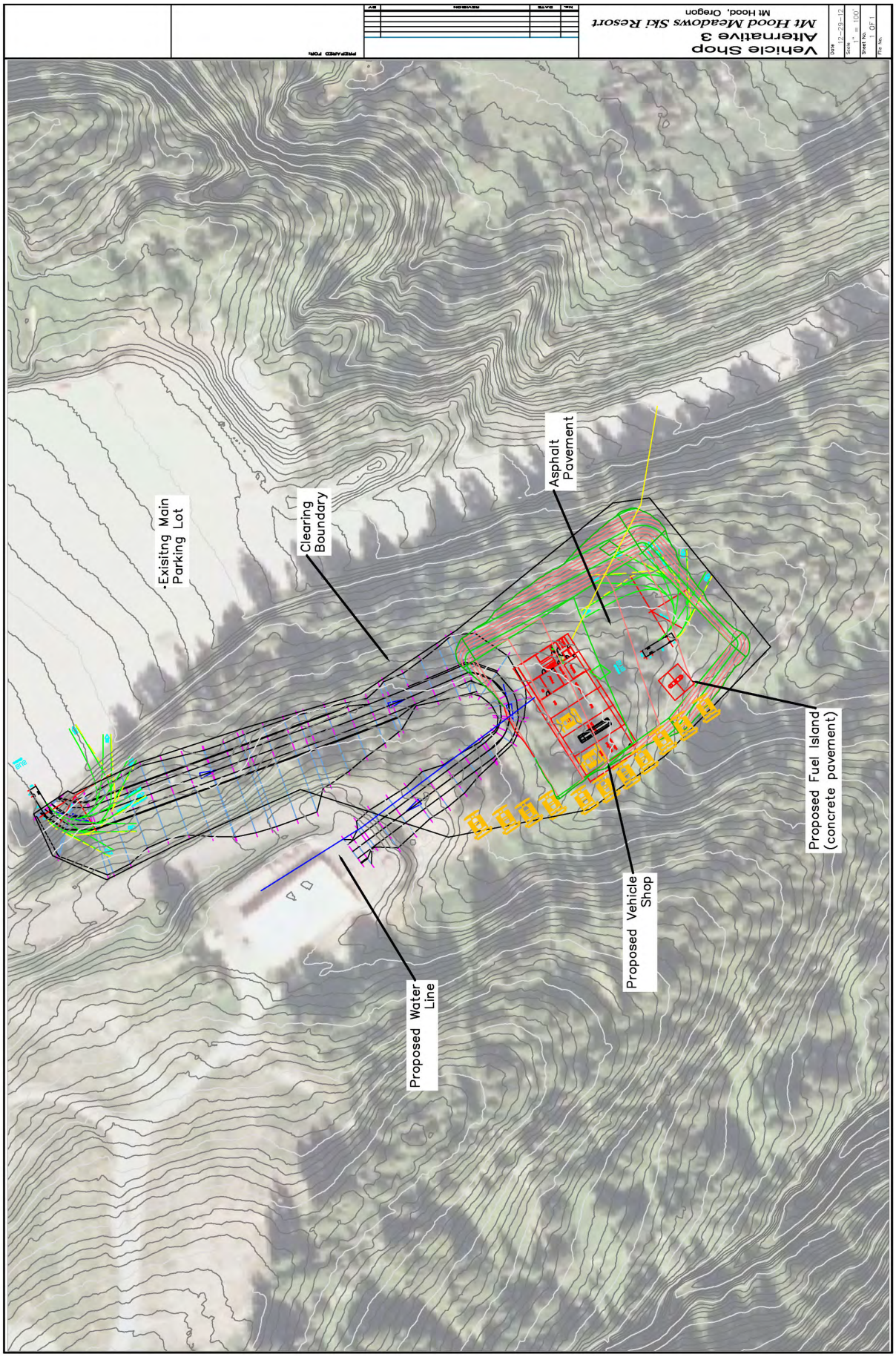

Figure 2-3: Alternative 3, Sunrise Vehicle Maintenance Shop

2.2.4 Alternative 4 – Elk Meadow Master Plan

In order to respond to concerns raised by the public regarding consistency to the Master Plan (Issue 1), Alternative 4 was designed to be fully consistent with the Master Plan. To be consistent with the Master Plan, the footprint of the parking lot size was reduced to 8 acres and the footprint of the maintenance shop was less than 3 acres. Figure 2-4 is an overview map for this alternative.

Figure 2-5 is a map of the proposed parking lot including the connected actions, and Figure 2-6 is a map of the proposed maintenance building for this alternative. This alternative includes the construction of an additional 4.9 acres of parking for both downhill and Nordic customers at the Mt. Hood Meadows Ski Resort. The Twilight Parking Lot would be located between the Sahalie Falls and Elk Meadows trails and existing Nordic ski trails. This alternative moves the parking lot location to minimize impacts to the existing Nordic ski trails. In total, 8.0 acres would be cleared for this parking lot, snow storage, and a storm water facility. The overall parking capacity for MHM would be 3,245 vehicles, including the additional 598 vehicles from the Twilight Parking Lot. The Twilight Parking Lot Equipment Maintenance Yard (Bus Shop) would <u>not</u> be constructed under this alternative.

Also, to improve parking capacity as well as customer safety, the vehicle maintenance functions would be moved away from the Mt. Hood Meadows Main Parking Lot and located near the existing Sunrise Parking Lot and would be accessed from FSR 3555. The new Sunrise Vehicle Maintenance Shop would not be connected to the existing parking lot as proposed in Alternative 2. The location was changed compared to Alternative 2 in order to minimize the changes associated with snow storage and storm water management associated with the Sunrise Parking Lot (see Section 3.4, Water Quality for more details on these effects). The shop building would be approximately 65 by 150 feet in size and constructed on 2.5 acres. The size of the shop building is the same as Alternative 2. A 130-foot access road would be constructed as part of this alternative. As with all action alternatives, the existing shop would initially be used for storage.

Additionally, in order to accomplish the activities proposed above, this alternative includes the following.

- Access Roads – A 300-foot access road would be constructed to access the Twilight Parking Lot.

- Nordic Guest Services Building – The guest service building would remain the same as Alternative 2. The location would change to the new parking lot location for this alternative.

Lastly, the connected actions associated with this alternative are listed below.

- Utility Lines (power, water, sewer and telephone) – The utility lines would remain the same as Alternative 2, but a shorter distance would be required to service these facilities. A 400-foot water line would be buried into the same corridor as an existing power line from the Administrative Building and a 1000-foot sewer line would be dug into the roadway of the main parking lot.

- Turn Lanes – The construction of the turn lanes would be the same as Alternative 2.

- Wetland Relocation – The relocation of the wetland would be the same as Alternative 2.

- Nordic Ski Trails – This alternative would not impact any Nordic ski trails within the permit area. All of the existing Nordic trails would be planted with native species in order to narrow the trails to mitigate for huckleberry loss associated with the parking lot construction. The trails would be 25-foot clearings with an additional 8 feet of thinning on either side of the trail to allow for snow accumulation. The additional 8 feet would be thinned to 30 percent canopy closure in order to encourage huckleberry production. The total width of disturbance for the Nordic trails would be 41 feet.

- Sahalie Falls Trail (Forest Service Trail #667c) – The Sahalie Falls trail would be re-routed around the proposed parking lot to provide screening (see Figure 2-7). The re-route (650 feet) parallels the existing route. The trail would remain a Class 3 trail for pedestrian and bike use. As such, the trail design parameters would be a trail width of 18 to 24 inches with a target trial grade of 3 to 10 percent and target cross slope of 3 to 8 percent. The trail would be a native surface trail. The total clearing limit would be six to eight feet in height and five to six feet in width. There would be no change to the existing trailhead parking.

Overall, Alternative 4 would impact 11.1 acres of A11 lands (Winter Recreation Area) within the Mt. Hood Meadows Ski Resort permit area, plus an additional 0.5 acres along Highway 35. This includes the acres of disturbance associated with the Twilight Parking Lot, Sunrise Maintenance Building, Twilight Parking Lot Equipment Maintenance Yard (Bus Shop), utility lines, access roads, Nordic ski trail construction, and Sahalie Falls trail re-route.

Master Plan Consistency

This alternative is fully consistent with the MHM Master Plan. The proposed Twilight Parking Lot is 8.0 acres including storm water management and snow storage, as described on page 10 of the ROD. Also, the Sunrise Maintenance Shop is less than the 3 acres described in the ROD on page 9, but it is not in the recommended location described on page 10. Although the recommended location was considered, it was not selected in order to minimize the acres of disturbance associated with the new building by co-locating it adjacent to the Sunrise Parking Lot. Also, the recommended location is in close proximity to wetlands and Riparian Reserves. Lastly, the recommended location was determined not to be favorable for the movement of snow cats during low snow levels due to the distance of travel. The ROD does allow other locations to be considered, but notes that the advantages to the recommended site are: "it has been previously committed to development, provides easy access for grooming machines to the ski slopes, and represents an opportunity to provide a small area for employee parking." The selected location does utilize an area previously committed to development and provides easy access for grooming machines to the ski slopes, plus it minimizes the impacts to wetlands and Riparian Reserves. As such, both the parking lot and maintenance shop are consistent with the Master Plan ROD.

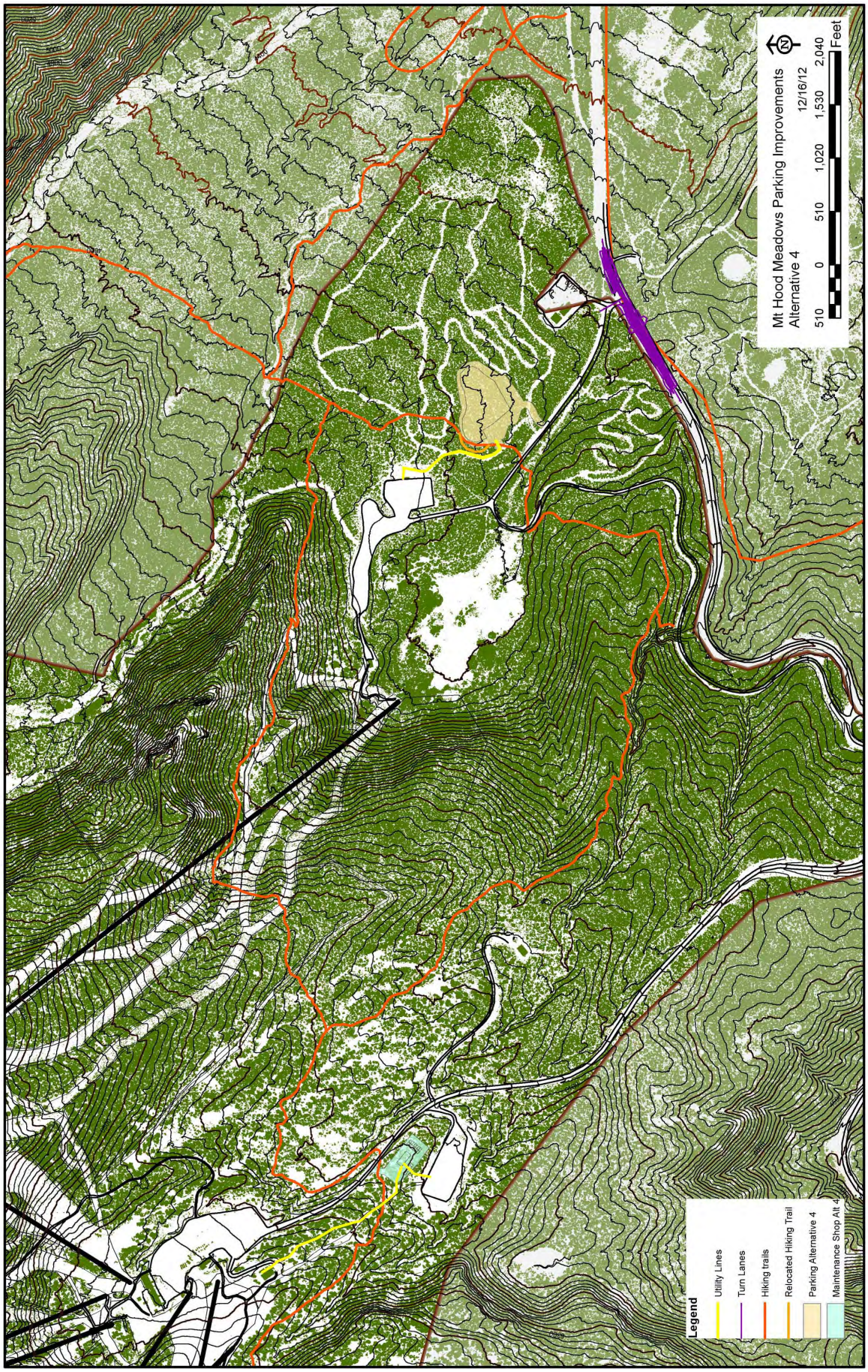

Figure 2-4: Overview Map for Alternative 4 – Elk Meadow Master Plan

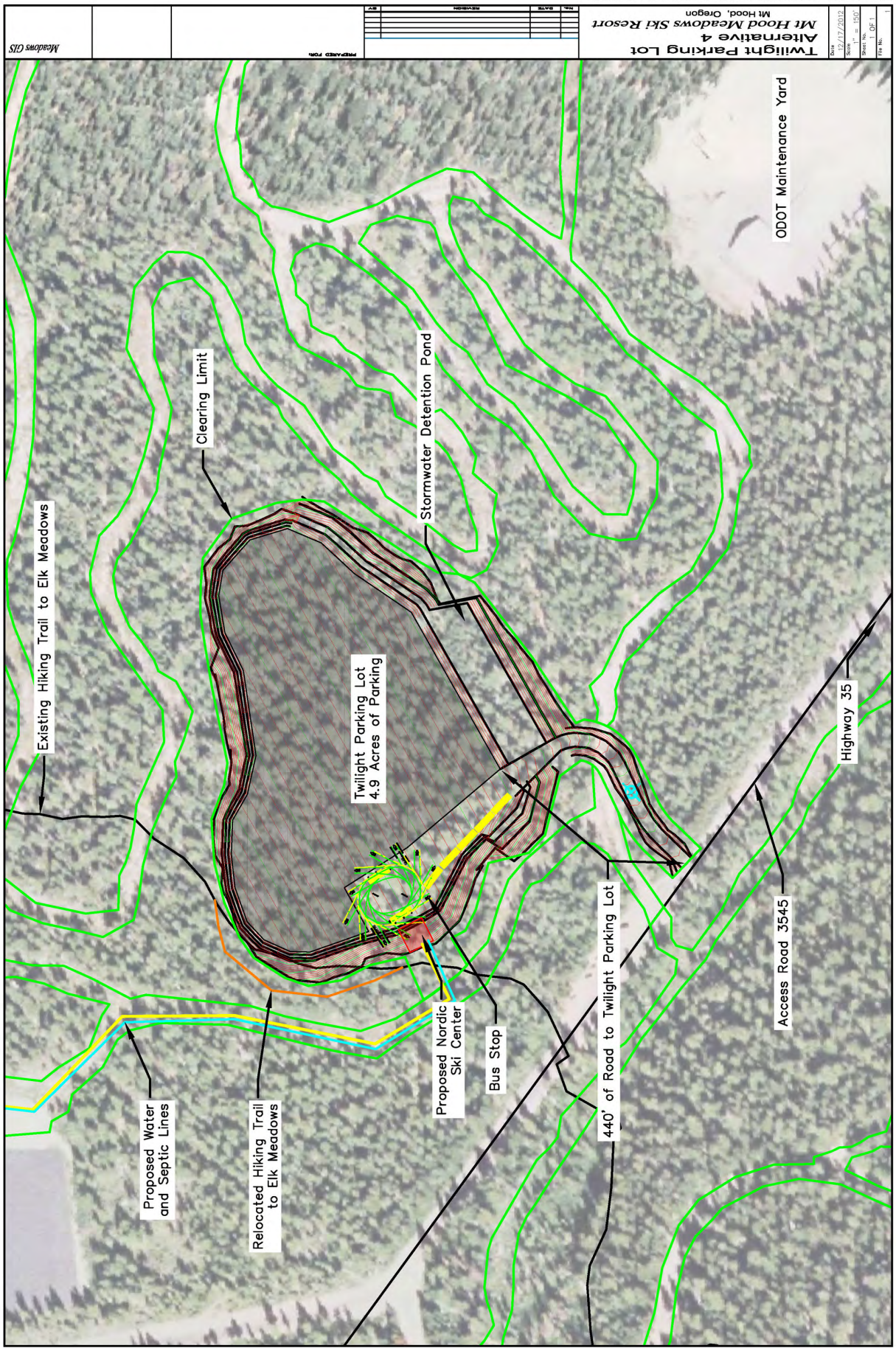

Figure 2-5: Alternative 4, Twilight Parking Lot

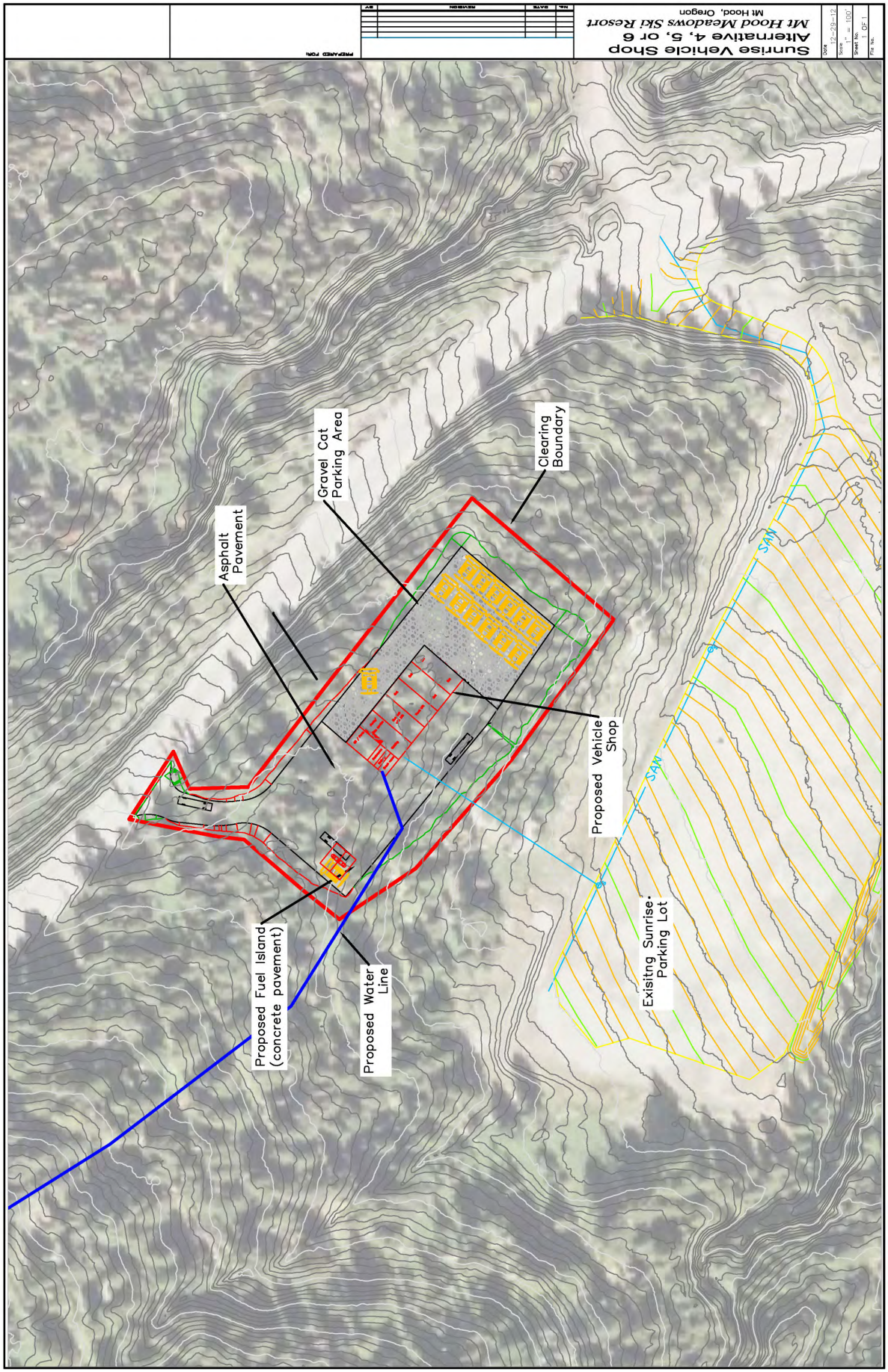

Figure 2-6: Alternatives 4, 5 and 6, Sunrise Vehicle Maintenance Shop

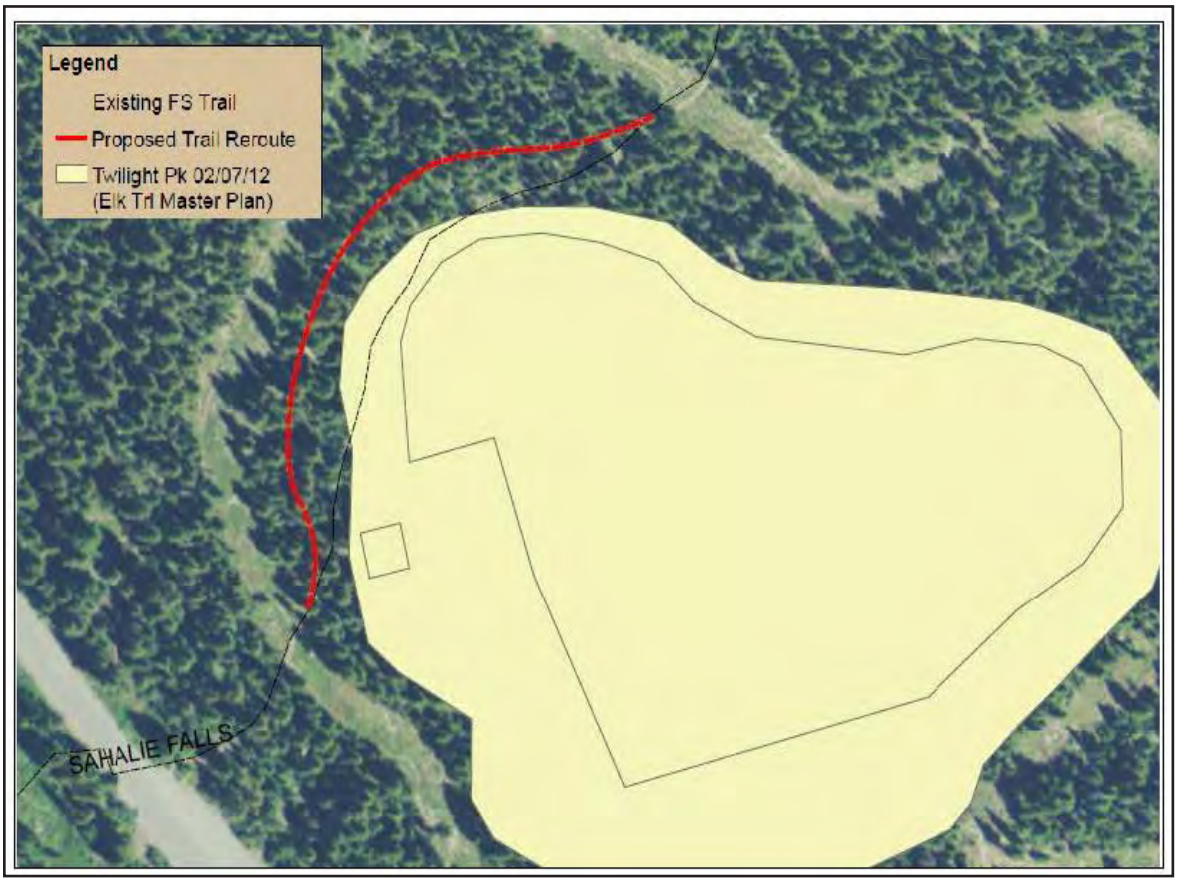

Figure 2-7: Sahalie Falls Trail Re-route for Alternative 4

2.2.5 Alternative 5 – Elk Meadow

Alternative 5 was designed to fully address Issue 2: Nordic Skiing by moving the parking lot location, while more closely resembling the initial proposals submitted by MHM in the overall parking capacity. The new location of the parking lot minimizes the impacts to Nordic ski trails, but increases the parking lot size compared to Alternative 4. Figure 2-8 is an overview map for this alternative.

Figure 2-9 is a map of the proposed parking lot including the connected actions. The Twilight Parking Lot for this alternative is in the same location as Alternative 4. The size of the parking lot is increased to 6.8 acres to accommodate both downhill and Nordic customers at the Mt. Hood Meadows Ski Resort. In total, 11.3 acres would be cleared for this parking lot, snow storage, and a storm water facility. The overall parking capacity for MHM would be 3,477 vehicles, including the additional 830 vehicles from the Twilight Parking Lot.

Also, to improve parking capacity as well as customer safety, the vehicle maintenance functions would be moved away from the Mt. Hood Meadows Main Parking Lot and located near the existing Sunrise Parking Lot and would be accessed from FSR 3555. The Sunrise Vehicle Maintenance Shop proposal for this alternative is the same as Alternative 4 (see Figure 2-6).

Additionally, in order to accomplish the activities proposed above, this alternative includes the following.

- Twilight Parking Lot Equipment Maintenance Yard (Bus Shop) – An additional 2.5 acres would be cleared for an equipment maintenance yard, which would include bus and snow equipment parking and a maintenance building. The bus shop would be co-located with the Twilight Parking Lot.
- Access Roads – Two access roads (approximately 370 feet or 0.6 acres) would be constructed. One access road would lead to the Twilight Parking Lot Equipment Maintenance Yard (70 feet) and the other to the Twilight Parking Lot (300 feet).
- Nordic Guest Services Building – The guest service building would remain the same as Alternative 4.

Lastly, the connected actions associated with this alternative are listed below.

- Utility Lines (power, water, sewer and telephone) – The construction of the utility lines would be the same as Alternative 4.
- Turn Lanes – The construction of the turn lanes would be the same as Alternative 2.
- Wetland Relocation – The relocation of the wetland would be the same as Alternative 2.
- Nordic Ski Trails – Since the proposed Twilight Parking Lot would remove some Nordic ski trails, approximately 0.2 mile (or 870 feet) of Nordic ski trails would be constructed so that there would be no net loss of ski trails (see Figure 2-8). All new Nordic trails would be 25-foot clearings with an additional 8 feet of thinning on either side of the trail to allow for snow accumulation. The additional 8 feet would be thinned to 30 percent canopy closure in order to encourage huckleberry production. The total width of disturbance for the Nordic trails would be 41 feet. In addition, all of the existing Nordic trails would be planted with native species in order to narrow the trails and meet these same design features.
- Sahalie Falls Trail (Forest Service Trail #667c) – The Sahalie Falls trail would be re-routed around the proposed parking lot (see Figure 2-10). The re-route (1,500 feet) coincides with the proposed existing and new Nordic trails. The trail would remain a Class 3 trail for pedestrian and bike use. There is no additional disturbance associated with this re-route. The trail would be a native surface trail. There would be no change to the existing trailhead parking.

Overall, the Alternative 5 would impact 17.6 acres of A11 lands (Winter Recreation Area) within the Mt. Hood Meadows Ski Resort permit area, plus an additional 0.5 acres along Highway 35. This includes the acres of disturbance associated with the Twilight Parking Lot, Sunrise Maintenance Building, Twilight Parking Lot Equipment Maintenance Yard (Bus Shop), utility lines, access roads, and Nordic ski trail construction.

Master Plan Consistency

This alternative is <u>inconsistent</u> with the MHM Master Plan. The proposed Twilight Parking Lot is 11.3 acres including storm water management and snow storage, rather than 8 acres as described on page 10 of the ROD. In addition, the Twilight Equipment Maintenance Yard (Bus

Shop) includes another 2.5 acres of clearing. The total clearing associated with this alternative is 13.8 acres. As such, the Twilight Parking Lot is not consistent with the Master Plan. Also, the Sunrise Maintenance Shop is less than the 3 acres described in the ROD on page 9, but it is not in the recommended location described on page 10. Since the location for the maintenance shop is the same as Alternative 4, a complete description of consistency can be found in Section 2.2.4. If this alternative is selected by the Responsible Official, this EIS would supersede the related management direction and recommendations provided in the ROD related to the parking lot expansion for Mt. Hood Meadows Ski Area Master Plan Final Environmental Impact Statement, including Forest Plan Amendment No. 10 (January 1997).

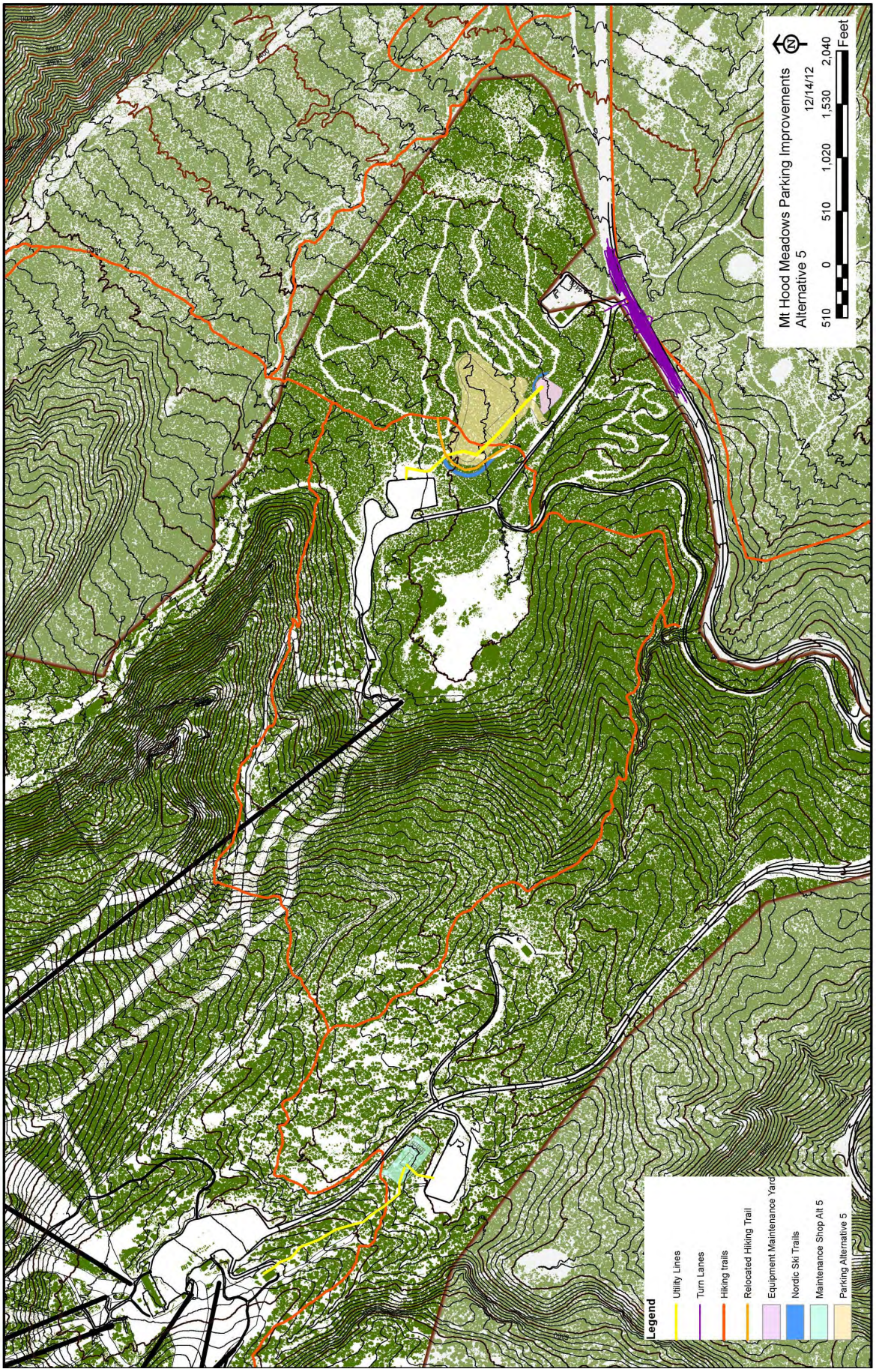

Figure 2-8: Overview Map for Alternative 5 – Elk Meadow

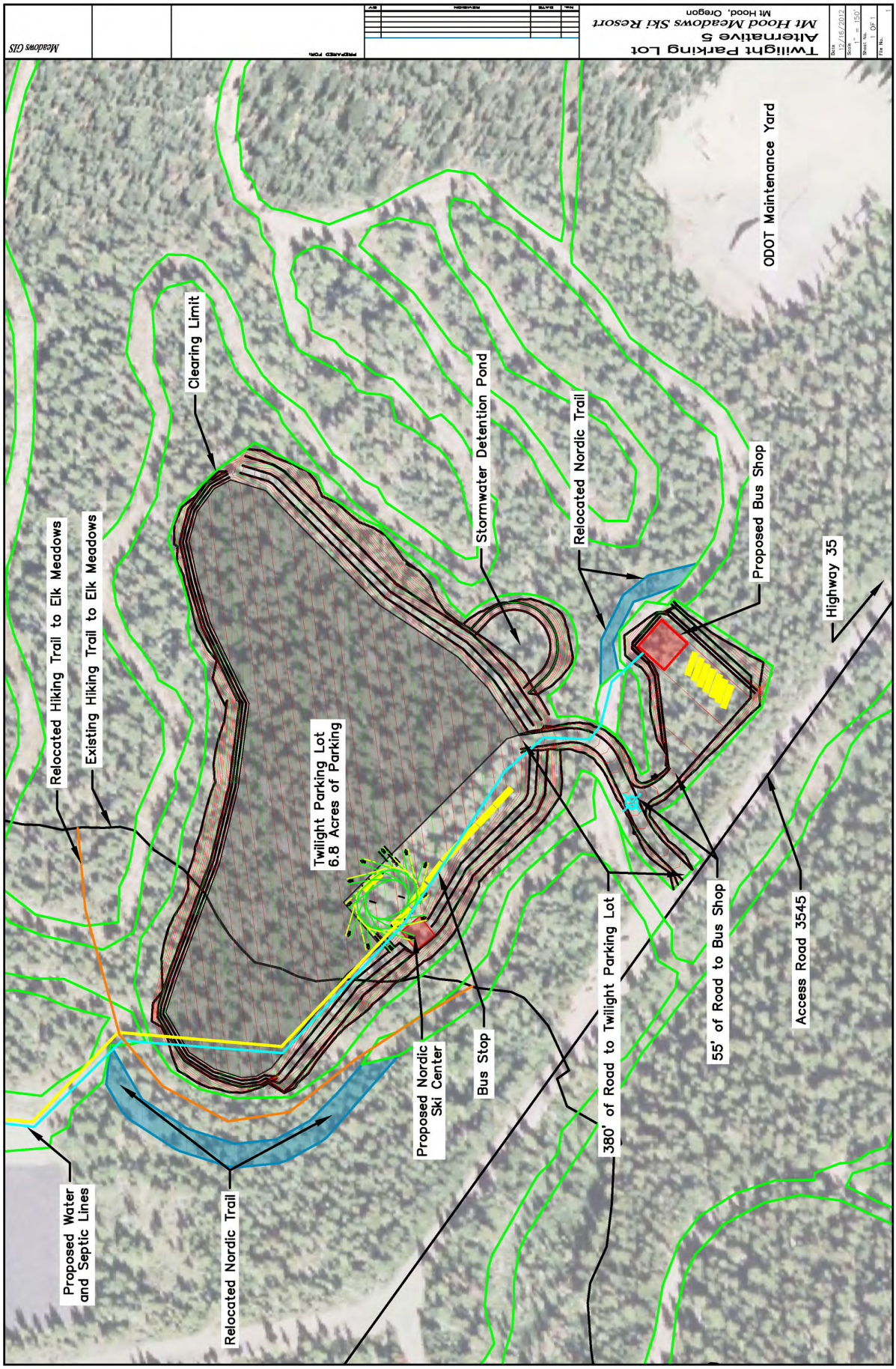

Figure 2-9: Alternative 5, Twilight Parking Lot

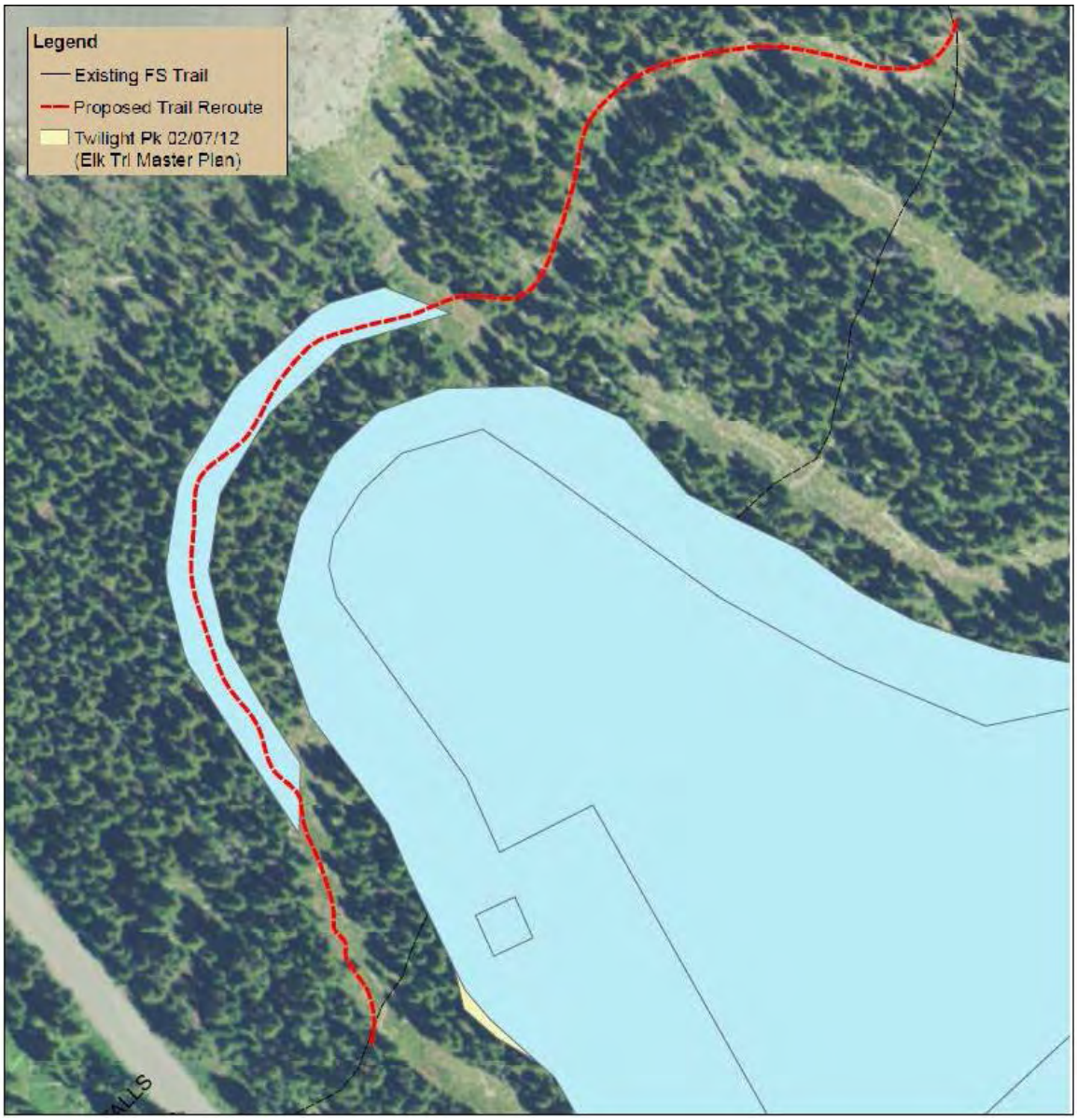

Figure 2-10: Sahalie Falls Trail Re-route for Alternative 5

2.2.6 Alternative 6 – Preferred Alternative

Alternative 6 was developed as the Preferred Alternative after considering public involvement as well as the environmental consequences discussed in Chapter 3. The public involvement included the comments received during the scoping period, discussions during the field trip and conversations with individuals, organizations, the permittee, and government agencies. The Council on Environmental Quality (CEQ) defines the agency's preferred alternative as: "the alternative which the agency believes would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors" (CEQ 40 FAQs). Further, Section 1502.14(e) of the NEPA regulations states that the agency shall "identify the agency's preferred alternative if one or more exists, in the draft statement." The Responsible Official identified different components from the action alternatives that were analyzed in detail and these were incorporated into the Preferred Alternative (Alternative 6). Figure 2-11 is an overview map for this alternative.

The Twilight Parking Lot for this alternative is in the same location and same size as Alternative 2. Figure 1-3 is a map of the proposed parking lot including the connected actions. A 7.2 acre parking lot for both downhill and Nordic customers would be constructed. The parking lot would be located east of the Elk Meadows trailhead and west of ODOT sand shed with access via FSR 3545. In total, 9.4 acres would be cleared for this parking lot, snow storage, and a storm water facility. The overall parking capacity for MHM would be 3,526 vehicles, including the additional 878 vehicles from the Twilight Parking Lot.

Also, to improve parking capacity as well as customer safety, the vehicle maintenance functions would be moved away from the Mt. Hood Meadows Main Parking Lot and located near the existing Sunrise Parking Lot and would be accessed from FSR 3555. The Sunrise Vehicle Maintenance Shop proposal for this alternative is the same as Alternative 4 (see Figure 2-6).

Additionally, in order to accomplish the activities proposed above, this alternative includes the following.

- Twilight Parking Lot Equipment Maintenance Yard (Bus Shop) – The construction of the bus shop would be the same as Alternative 2. A total of 2.9 acres would be cleared for an equipment maintenance yard.

- Access Roads – The construction of the access roads would be the same as Alternative 2. Approximately 500 feet (0.9 acres) of access roads would be constructed.

- Nordic Guest Services Building – The guest service building would remain the same as Alternative 2.

- Utility Lines (power, water, sewer and telephone) – The construction of the utility lines would be the same as Alternative 2.

- Turn Lanes – The construction of the turn lanes would be the same as Alternative 2.

- Wetland Relocation – The relocation of the wetland would be the same as Alternative 2.

- Nordic Ski Trails – The proposed Twilight Parking Lot would remove approximately a half mile (or 2,746 feet) of Nordic ski trails from the Hanel and Little Loops. The trails constructed as a connected action are the same as Alternative 3 as shown in Figure 1-3. All new Nordic trails would be 25-foot clearings with an additional 8 feet of thinning on either side of the trail to allow for snow accumulation. The additional 8 feet would be thinned to 30 percent canopy closure in order to encourage huckleberry production. The total width of disturbance for the Nordic trails would be 41 feet. In addition, all of the existing Nordic trails would be planted with native species in order to narrow the trails and meet these same design features.

- Sahalie Falls Trail (Forest Service Trail #667c) would not be impacted by this alternative.

Lastly, the connected actions associated with this alternative are listed below.

- Utility Lines (power, water, sewer and telephone) – The construction of the utility lines would be the same as Alternative 2.

- Turn Lanes – The construction of the turn lanes would be the same as Alternative 2.

- Wetland Relocation – The relocation of the wetland would be the same as Alternative 2.

- Nordic Ski Trails – The proposed Twilight Parking Lot would remove approximately a half mile (or 2,746 feet) of Nordic ski trails from the Hanel and Little Loops. The trails constructed as a connected action are the same as Alternative 3 as shown in Figure 1-3. All new Nordic trails would be 25-foot clearings with an additional 8 feet of thinning on either side of the trail to allow for snow accumulation. The additional 8 feet would be thinned to 30 percent canopy closure in order to encourage huckleberry production. The total width of disturbance for the Nordic trails would be 41 feet. In addition, all of the existing Nordic trails would be planted with native species in order to narrow the trails and meet these same design features.

- Sahalie Falls Trail (Forest Service Trail #667c) would not be impacted by this alternative.

Overall, the Preferred Alternative would impact 19.0 acres of A11 lands (Winter Recreation Area) within the Mt. Hood Meadows Ski Resort permit area, plus an additional 0.5 acres along Highway 35. This includes the acres of disturbance associated with the Twilight Parking Lot, Sunrise Maintenance Building, Twilight Parking Lot Equipment Maintenance Yard (Bus Shop), utility lines, access roads, and Nordic ski trail construction.

Master Plan Consistency

This alternative is inconsistent with the MHM Master Plan. The proposed Twilight Parking Lot is 9.4 acres including storm water management and snow storage, rather than 8 acres as described on page 10 of the ROD. In addition, the Twilight Equipment Maintenance Yard (Bus Shop) includes another 2.5 acres of clearing. The total clearing associated with this alternative is 12.3 acres. As such, the Twilight Parking Lot is not consistent with the Master Plan. Also, the Sunrise Maintenance Shop is less than the 3 acres described in the ROD on page 9, but it is not in the recommended location described on page 10. Since the location for the maintenance shop is the same as Alternative 4, a complete description of consistency can be found in Section 2.2.4. If this alternative is selected by the Responsible Official, this EIS would supersede the related management direction and recommendations provided in the ROD related to the parking lot expansion for Mt. Hood Meadows Ski Area Master Plan Final Environmental Impact Statement, including Forest Plan Amendment No. 10 (January 1997).

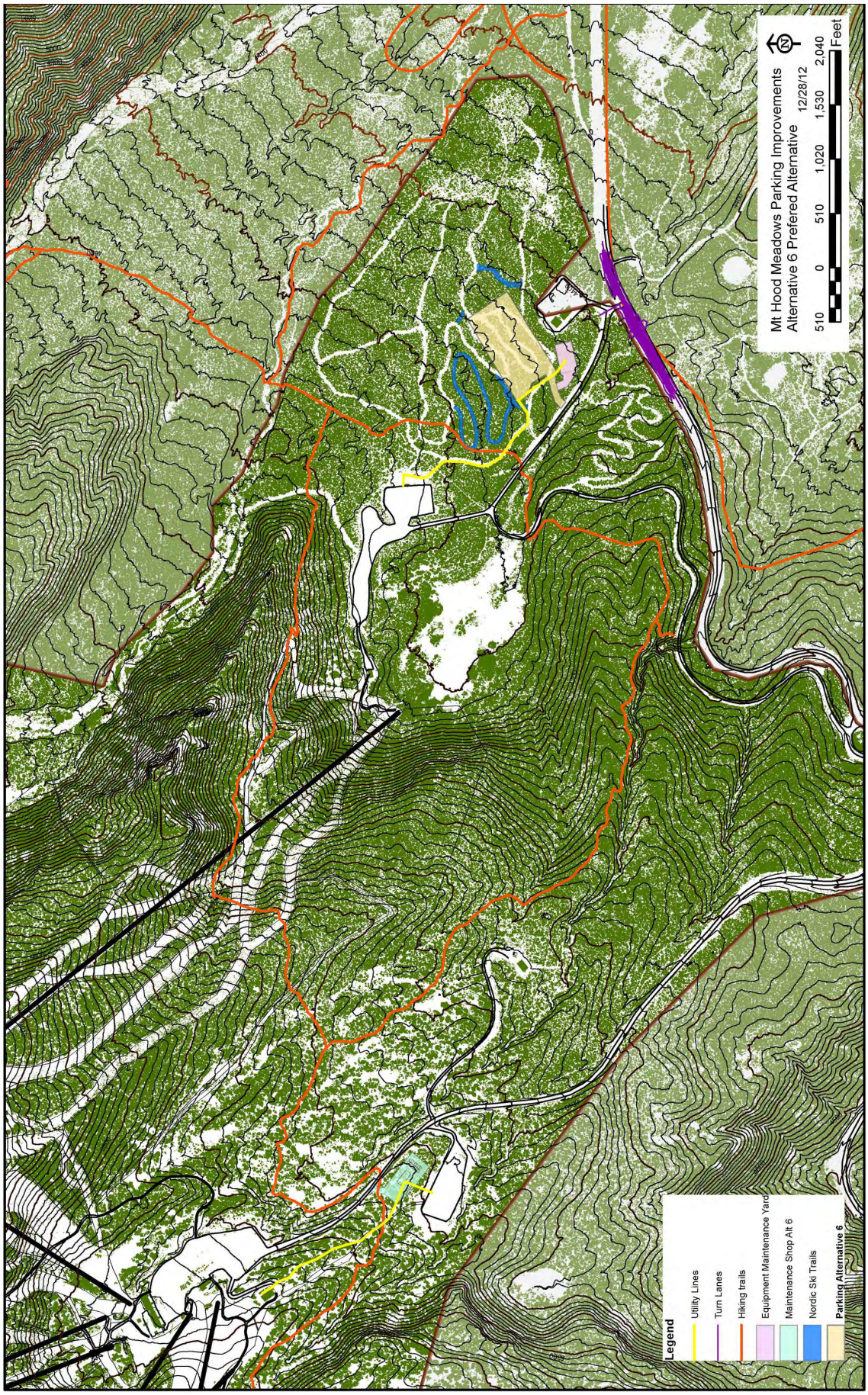

Figure 2-11: Overview Map for Alternative 6 – Preferred Alternative

2.3. Project Design Criteria

The National Environmental Policy Act defines "mitigation" as avoiding, minimizing, rectifying, reducing, eliminating or compensating project impacts. The following project design criteria and mitigation measures (PDC) are an integral part of this project and would be carried out if the project is implemented under Alternatives 2 through 6. PDC are not optional and are incorporated in the effects analysis in Chapter 3.

In addition to these PDC, all of the applicable Require Mitigation and Monitoring listed in Appendix A of the Record of Decision for Mt. Hood Meadows Ski Area Master Plan/Access Road Final Environmental Impact Statement would be included as part of this project. Some of the mitigation measures have been repeated in the following section for emphasis as related to this project. As directed by the Master Plan, "monitoring and enforcement of required mitigation measures by the Forest Service will occur though the Annual Operating Permit and the Special Use Permit. A monitoring program will be developed as part of the environmental analysis required for each phase of development and implemented as soon as possible after approval of each phase to determine the effectiveness of mitigation measures" (page A-1). The monitoring plan for this project is discussed in Section 2.5 of this EIS.

Construction

C-1. Establish and maintain construction area limits to the minimum area necessary for completion of the project and confine disturbance within this area.

C-2. Erosion cloth/wattles and seed should be used on fill slopes if their height exceeds three feet, otherwise seed and mulch should be sufficient.

C-3. Seed and mulch the bare ground upon construction completion. Erosion cloth/wattles and seed should be used to cover bare ground if within Riparian Reserves[3] . Cut and fill slopes would be stabilized by prompt revegetation and grading to a slope gradient or terracing approved by the Forest Service to reduce the potential of long-term erosion and slope failures (MHM ROD, Soils #2, page A-4).

C-4. Install sediment and storm water controls prior to initiating ground disturbing activities to the extent practicable.

C-5. For construction areas immediately adjacent to a stream or other wet area, or where fill is near a wetted stream, use appropriate erosion/sediment control barriers between the project and the stream.

C-6. Maintain erosion and storm water controls as necessary to ensure proper and effective function by:
- Preparing for unexpected failures of erosion control measures; and,
- Implementing corrective actions without delay if failures are discovered to prevent pollutant discharge to nearby water bodies.

3- Riparian Reserve refers to the Northwest Forest Plan Riparian Reserve designation.

C-7. To minimize tree stump removal in areas where pavement and/or structures would not be placed, trees would be flush cut to the extent feasible (MHM ROD, Soils #13, page A-4). Stumps may be ground down to reduce height, but not dug out and removed. The intent of this PDC is to minimize soil damage by retaining tree roots and minimizing disturbance.

C-8. Dispose of waste material in stable sites out of the flood prone area and leave in a stable configuration that limits surface erosion and off-site movement of soil. Waste material other than hardened surface material (asphalt, concrete, etc.) may be used to restore natural or near-natural contours. Material disposal areas would be approved by the Forest Service prior to use.

C-9. Minimize time in which heavy equipment is in stream channels, riparian areas, and wetlands. Forest Service personnel would approve the routes for the equipment through stream channels, riparian areas, and wetlands.

The following PDCs pertain specifically to the Twilight Equipment Maintenance Yard and Sunrise Vehicle Maintenance Shop.

C-10. Locate, design, construct and maintain petroleum and chemical delivery and storage facilities consistent with applicable local, state and federal regulations.

C-11. Use suitable measures around vehicle service, storage and refueling areas, chemical storage and use areas, and waste dumps to fully contain spills and avoid or minimize soil contamination and seepage to groundwater.

C-12. Prohibit excess chemicals or wastes from being stored or accumulated in either maintenance area.

C-13. Report spills and initiate suitable clean-up action in accordance with applicable state and federal laws, rules and regulations.

Recreation

R-1. Tow-away zones should be established and signed on the access roads to direct patrons to the developed parking areas or inform patrons that there is no parking on the access road.

R-2. Mt. Hood Meadows should patrol and manage patron parking in authorized parking areas/lots.

R-3. Shuttle services should not be provided from Mt. Hood Meadows Access Road (FSR 3555) Tea Cup and Bennet Pass Sno-Parks to Mt Hood Meadows Ski Resort.

R-4. Prior to implementation of any additional authorized parking [including Twilight Parking Lot], Mt. Hood Meadows Ski Resort should continue to develop a mitigation plan to address winter peak period traffic congestion of Highway 26 attributable to Mt. Hood Meadows Ski Resort Ski Area. Coordination with ODOT is recommended (MHM ROD, Transportation #3, page A-16).

R-5. Trail Management Objective (TMOs) should be developed in coordination with Forest Service personnel prior to the construction of any new Nordic ski trails and hiking trails.

R-6. The permittee(s) would be responsible for the construction, management and maintenance, per Forest Service standard for all Nordic trails within the permit area.

R-7. In order to prevent road gravel from being deposited on the Nordic ski trails, measures should be taken such as minimize traction gravel, provide a buffer, or create snow berms.

R-8. Mowing of all Nordic trails is only permitted in the 25-foot center clearing. Mowing is not permitted within the thinned areas adjacent to the center clearing.

R-9. During Construction activities, signs should be placed at existing trailheads to warn of timber harvest activities in the area.

Visuals

V-1. Vegetation clearing for parking facilities should be designed to maximize the screening potential of existing vegetation when possible.

V-2. Repetitive clearing patterns that would result in straight lines, edges, or geometric shapes of vegetation patterns and openings should be avoided. Where extensive clearing is unavoidable, natural-appearing openings should be created that resemble those of the natural characteristic landscape, such as meadows and fire-related disturbances. Existing openings may be expanded to mimic natural shapes and edges (MHM ROD, Visual Resources #3, page A-11).

V-3. Edge treatments for all clearings should be designed in consultation with appropriate Forest Service personnel.

V-4. Edge treatments include scalloping and feathering existing vegetation to avoid harsh unnatural linear effects. Edges of clearings in areas of multi-state and species compositions should be located, to the extent possible, to aid in creating natural – appearing transitional effects (MHM ROD, Visual Resources #4, page A-11).

V-5. All mechanical brush piles and skid trails should be located at least 1000-feet from the Elk Meadows Trail.

V-6. All stumps within 100-feet of the Elk Meadows trail should be cut to 6-inches in height or angled cuts away from the trail. Fresh cut surfaces should be camouflaged so they are not visible from the trail.

V-7. Non-reflective materials would be used for exterior surfaces that blend with the environment. Facilities with reflective exterior surfaces (metal, glass, plastic, etc.) which do not blend with the summer environment would be temporarily removed, covered, painted, stained, chemically treated, etched, sandblasted, corrugated, or otherwise treated in a manner to meet solace reflectively standards in Forest Service Manual 2380 (MHM ROD, Visual Resources #8, page A-11).

V-8. Facilities would be constructed of materials which blend with the earth tone colors of the environment. Buildings, structures, facilities and utilities would be constructed of native materials and/or painted, stained, or modified to achieve the required visual blending. Exterior colors, shapes, and textures of all facilities, except when required for safety, would be subordinate to the surrounding landscape. All exterior colors and materials would be approved by the authorized Forest Service representative prior to construction (MHM ROD, Visual Resources #9, page A-11).

V-9. Exterior lighting would be designed to illuminate horizontal, or ground plane, surfaces only. The lighting of vertical surfaces, such as walls, which can be seen from sensitive viewpoints (Highway 35 and FSR 3545) would be avoided. Exterior lights should be from the warm spectrum wavelength, such as high pressure sodium, or other "yellow" sources (MHM ROD, Visual Resources #10, page A-11).

V-10. The best available glazing technology would be used to subdue light transmission to the exterior of facilities. Shading devices would be used as appropriate to eliminate exterior light transmission (MHM ROD, Visual Resources #11, page A-11).

Aquatics

A-1. Erosion control plans to reduce erosion and soil compaction would be submitted to the Forest Service for approval for each phase of construction, restoration and maintenance. If construction takes two or more years, interim erosion control methods would be identified (MHM ROD, Soils #1, page A-4).

A-2. Ground disturbance (excavation, fill, grading) would be implemented to minimize soil exposure during periods of snowmelt and rainy periods (MHM ROD, Soils #11, page A-4). The intent of the PDC is to reduce the risk of soil erosion during late spring and early fall when storm events are common and snow does not blanket the ground.

A-3. Inspect construction sites to verify that erosion and storm water controls are implemented and functioning as designed and are appropriately maintained.

- Construction sites would be inspected a minimum of twice a week and within 24 hours of significant storms (0.5 inches/24 hour, or where runoff is generated).
- In addition, inspections should occur after construction is complete until areas of bare soil are completely covered by natural vegetation growth.

A-4. Project construction and maintenance activities would be avoided in particularly sensitive areas, areas that are consistently saturated or have perennially shallow water table conditions (i.e., wetlands), and critical areas of groundwater recharge/discharge within the Permit Area (MHM ROD, Watershed #3, page A-5).

A-5. Appropriate no touch buffers, where needed, would be established to protect riparian areas for all construction zones and surrounding areas where ground disturbance may have potential impacts on riparian values. Forest Service personnel would establish the appropriate no touch buffer.

A-6. Landings for cut trees and other removed vegetation would be placed in areas that would eventually be paved and/or where buildings would be constructed.

A-7. The design of ski and hiking trails should integrate existing landform characteristics such as natural swales, dips, and elevations that don't disrupt natural water flow patterns. The intent of this PDC is to allow, the extent feasible, natural overland water flow patterns and processes to continue.

A-8. Follow the appropriate Oregon Department of Fish & Wildlife (ODFW) guidelines for timing of in-water work (July 15-August 31) if applicable.

A-9. Mt. Hood Meadows Ski Resort would acquire all appropriate Local, State and Federal Permits for this project including, but not limited to, **National Pollutant Discharge Elimination System** (NPDES) Permit Storm Water Permit for Discharge from Construction Activity and a Clean Water Act (CWA) 404 permit from the Army Corps of Engineers when dredge or fill material would be discharged to waters of the U.S.

A-10. A Pollution and Erosion Control Plan (PECP) commensurate with the scale of the project would be required for all construction activities. At a minimum the plan would include the following. [4]

- Established staging areas for construction equipment storage, vehicle storage, fueling, servicing, hazardous material storage, etc. in locations that preclude erosion into or contamination of surface water and/or riparian areas. Fueling areas would be located at least 150 feet away from surface water. Staging areas should be approved by an appropriate Forest Service specialist prior to use.
- Describe suitable measures around staging areas and waste or fill disposal sites to fully contain spills and avoid or minimize soil contamination and seepage to groundwater.
- A description of how clearing and grubbing activities associated with construction activities would minimize or eliminate erosion and/or contamination into riparian areas and water during and following construction.
- A Spill Prevention Control and Containment Plan (SPCCP) that describes measures to prevent or reduce impacts from potential spills (fuel, hydraulic fluid, etc.). The SPCCP would contain a description of the hazardous materials that would be used, including inventory, storage, handling procedures, and a description of quick response containment supplies that would be available on the site.
- The SPCCP would also include detailed instructions regarding the proper reporting procedures in the event a spill occurs.

A-11. The PECP should be included in construction contracts and/or force account work plans so that workers are aware and informed regarding the plans direction and intent.

- Designate a pollution and erosion control (PEC) supervisor who would be directly responsible for PEC review, maintenance and compliance. The name and telephone number of this person would be made available to the Ski Area Permit Administrator who is stationed in the Hood River Ranger District office.
- The PEC supervisor must be available, 24 hours, for rapid response to PEC problems and emergencies.
- A 24-hour phone number for the PEC supervisor would be posted in a clearly visible location on the project site. This number would be shared with the all of the contractor's and Mt. Hood Meadows Ski Resort personnel so they are aware that this person would be contacted immediately if anyone sees problems with the erosion and sediment control measures.

A-12. Minimize the number and length of stream crossings and access routes through riparian areas. Crossings and access routes should be at right angles. Riparian and channel crossings should be approved by the appropriate Forest Service specialists prior to use. Stream crossings should not increase risks of channel re-routing at low and high water conditions.

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4 - Project design criteria referenced as follows: National Marine Fisheries Service. April 28, 2007. Endangered Species Act – Section 7 Programmatic Consultation Biological and Conference Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation: Fish Habitat Restoration Activities in Oregon and Washington, CY2007-CY2012. NMFS No. P/NWR/2006/06530.

A-13. Existing roadways or travel paths would be used whenever reasonable. Minimize the number of new access paths to minimize impacts to vegetation. New access paths would be approved by the Forest Service prior to use.

A-14. Where needed, include hazard tree removal (amount and type) in project design. Fall hazard trees within riparian areas when they pose a safety risk. If trees can be kept on site fall trees towards streams or other surface water (unless safety reasons preclude falling in that direction). Keep felled hazard trees on site when needed to meet coarse woody debris objectives.

A-15. Develop a snow removal and gravel recovery plan for roads and parking areas needed for recreation, administrative, or other access to avoid, minimize, or mitigate adverse effects to soil, water quality and riparian resources. The snow removal plan would be approved by the Forest Service prior to implementation. The intent of this PDC is to prevent or minimize sanding material accumulation in surrounding areas.

A-16. The Twilight Parking Lot and Maintenance Shed should utilize storm water design methodology and treatment methods outlined in the EPA document "Technical Guidance on Implementing Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act" EP 841-B-09-001 for treatment of storm water. These designs should be reviewed by appropriate Forest Service staff prior to implementation.

A-17. Stockpile soil from the existing wetland in the ditchline and place in newly constructed ditchline for the right turn lane on Highway 35.

Wildlife

W-1. Any raptor nests observed in the area would be protected until evaluated by a Forest Service wildlife biologist. Disturbance of raptors or raptor nests would be prohibited except as specifically permitted by the U.S. Fish and Wildlife Service and Oregon Department of Fish and Wildlife. Habitat protection zones would be established, pursuant to Forest Plan standards, for raptor nesting areas (MHM ROD, Wildlife #3, page A-9).

W-2. Due to the vicinity of the Northern Spotted Owl (NSO) nest to this project, there is a seasonal restriction from March 1st to July 15th within a disruption distance of 65 yards of the nest patch for chainsaws and heavy machinery. Beyond that disruption distance, work can occur earlier then July 15th.

W-3. 40 cut trees and/or snags (preferably half of each to account for different decomposition classes) from the Twilight Parking and Sunrise Maintenance Shop would be placed in the Mt. Hood Meadows Ski Resort permit area. Snags and cut trees in new Nordic trails would be left where possible or placed in corridors to help with hiding cover and rearing habitat for deer and elk.

W-4. The parking lot access road constructed under this planning process should be gated to reduce harassment to deer and elk during calving and rearing from April 30th to July 30th each year. If the ski season extends beyond April 30th, the restriction would begin as soon as the ski season ends. Also the restriction would be in place when there is less than 2-feet of snow adjacent to the Nordic ski trails in the non-compacted areas after April 30th.

W-5. [Nordic Ski trails] and other facilities would be designed to serve as habitat linkage for wildlife species by maintaining the maximum amount of timber and shrub vegetation between timber stands while allowing for safe and quality skiing opportunities. The use of natural openings would be maximized and over story removal minimized (MHM ROD, Wildlife #11, page A-10).

W-6. Disturbances to special or unique habitats including springs, seeps, wallow areas, natural mineral deposits used as licks, and talus would be avoided. If significant disturbances to any of these habitats would occur during development, a Forest Service wildlife biologist would be notified so that site-specific mitigation can be developed and implemented prior to disturbance (MHM ROD, Wildlife #12, page A-10).

Botany/Invasive plants

B-1. Develop and implement a post-construction site vegetation plan using suitable species and establishment techniques to revegetate the site in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.

B-2. In order to prevent any introduction of noxious weed and/or seeds onto the National Forest the actions conducted or authorized by written permit by the contractor, that would operate outside the limits of the road prism (including public works and service contracts), require the cleaning of all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering National Forest System Lands. Only construction and maintenance equipment and the equipment necessary to transport said equipment would be allowed to operate within the project area. All subsequent move-ins of equipment to the project area should be treated in the same manner as the initial move-in. This requirement does not apply to service vehicles, water trucks, pickups, cars, and/or similar vehicles (R6/SPS-601.01 Work).

B-3. Clean all vehicles with pressurized water prior to entering Forest Service lands. Forest Service personnel should inspect off-road equipment prior to start of work to ensure it is free of all soil, seeds, vegetative matter, and other debris that could hold or contain seeds (WO-CT6.36).

B-4. Pre-treatment of Noxious Weed sites: Spotted knapweed grows in the Oregon Department of Transportation sand-storage facility and is approved for treatment under the 2008 Site Specific Invasive Plant Treatment EIS (site treatment # 66-011). The site should be treated again in early spring 2012 if knapweed is present. Continued treatment of the site, if necessary, would reduce the risk of spreading knapweed from the Oregon Department of Transportation (ODOT) sand-storage area to the proposed project activity area.

B-5. Rock and Soil imported to the project area must come from a weed-free source that has been certified by a Forest Service botanist, range specialist, or residing county Weed and Pest Control Department official.

B-6. Use certified weed-free or weed-seed-free hay, straw, or wood fiber if mulch is required to prevent erosion control. Where practical, stockpile weed-seed-free topsoil and replace it on disturbed areas (e.g. road embankments, parking lot edges, etc.).

B-7. Use local native seed from grasses and/or forbs for restoration of disturbed areas. Seed may be collected from the surrounding area and sowed directly, or consult with the district

botanist for a source of local native grass seed. Locally adapted, genetically appropriate native plant materials should be given primary consideration for rehabilitating vegetation on disturbed sites (FSM 2070.3)

Cultural Resources

H-1. All designated cultural resource sites requiring protection would have a 100-foot buffer zone where heavy machinery and timber harvest would be excluded.

H-2. Impacts to new cultural sites identified during surveys for future projects would be avoided through project modifications. Sites that cannot be avoided, if found to be significant, would be mitigated through measures identified in consultation with SHPO and the Advisory Council on Historic Preservation. (MHM ROD, Cultural Resources #9, page A-14).

H-3. If cultural resource sites or materials are encountered during project construction, all activity in the immediate area would cease and the Forest Archaeologist consulted. The Archaeologist would determine the significance of the materials and specify appropriate mitigation measures in consultation with the CTWS (MHM ROD, Cultural Resources #10, page A-14).

H-4. Install signs asking the general public to honor tribal Treaty Rights with the Confederated Tribes of Warm Springs and refrain from collecting huckleberries over a 13.5 acre area in the vicinity of the proposed improvements. The area represents the greatest possible loss of huckleberries in any of the action alternatives.

H-5. If new huckleberry production does not increase adjacent to the Nordic trail or within the newly signed area, government-to-government consultation with the Confederated Tribes of Warm Springs may be re-initiated to discussion mitigation measures to offset the permanent loss of huckleberries resulting from this project.

H-6. Educate the members of the Confederated Tribes of Warm Springs about production of the huckleberries and location of new area within Mt. Hood Meadows Ski Resort Permit area.

Vegetation Management

VM-1. A vegetation management plan would be prepared for each phase of development that describes the treatment and prescriptions needed to perpetuate a healthy mixture of vegetation with a visually-pleasing mosaic pattern of vegetation types. Vegetation treatments would be determined based on sound silvicultural prescriptions and be designed to avoid injury, decay or disease to remaining trees (MHM ROD, Vegetation #7, page A-7).

VM-2. Mt. Hood Meadows should prepare a vegetation management plan for the Mt. Hood Meadows Ski permitted area. The management plan should address formal ski terrain-construction and maintenance; developed facilities-construction and maintenance; tree island-glading construction and maintenance; tree island-tree skiing/multiple generation thin; Whitebark Pine restoration thin; restoration site maintenance; wildlife habitat treatment; huckleberry treatment; and, hazard tree management.

VM-3. Any live Whitebark Pine trees that are removed as part of this project would be transplanted within the Mt. Hood Meadows Ski Resort permit area, if feasible. If it is not feasible to transplant the impacted Whitebark Pine, a new rust resistant seedling would be planted within the permit area.

VM-4. During construction a vegetation protection plan approved by the District Ranger would be used that outlines specific measures safeguarding against accidental or unplanned destruction of vegetation. Leave trees, islands and tree clearing limits would be adequately marked to avoid mistakes in clearing limits over time (MHM ROD, Vegetation #8, page A-7).

VM-5. Clearing and construction practices that minimize surface disturbance and vegetation removal would be utilized (MHM ROD, Vegetation #1, page A-6).

VM-6. The use of native species for landscaping and reclamation would be encouraged wherever possible in an effort to re-establish native vegetation over time (MHM ROD, Vegetation #3, page A-6).

VM-7. Dispersed trampling of plant communities would be avoided through construction of formal paths in heavy use areas and through other approved means (MHM ROD, Vegetation #4, page A-7).

Transportation

T-1. Mt. Hood Meadows would assume responsibility for maintenance of the proposed access roads.

T-2. In cooperation with ODOT, a traffic monitoring program would be maintained at MHM to be able to determine the effectiveness of traffic mitigation measures and the correlation of ski area usage to the total traffic volume.

2.4. Monitoring Framework

Monitoring is critical for evaluating the effectiveness of management decisions and the accuracy of analysis assumptions and conclusions. The Master Plan, Forest Plan and government-to-government consultation determined the monitoring requirements for this project. Each of these monitoring components are described below.

Master Plan Monitoring Requirements

Pursuant to the Master Plan, a monitoring plan would be developed for this project. The Master Plan states: "A monitoring program will be developed as part of the site-specific environmental analysis required for each phase of development and implemented as soon as possible after approval of each phase to determine the effectiveness of mitigation measures" (page 18). The required monitoring measures include: activities in areas of tree removal, construction of parking area, construction building, re-vegetation and restoration of disturbed areas, Best Management Practices (BMPs), cumulative visual effects, and road improvement effects. The monitoring plan would include implementation and effectiveness monitoring wherein the permit administrator ensures that various prescribed resource treatments are taken by the ski area, and determining whether they are effective. The Special Use Permit Administrator acts as primary point of contact with the permittee and would ensure that monitoring is completed. The permit administrator would enlist the assistance of resource specialists to monitor the project during implementation and for post-development monitoring. The resource specialists include, but are not limited to, a fisheries biologist, hydrologist, soil scientist, engineer, archeologist, recreation specialist, botanist, and wildlife biologist.

At a minimum, all monitoring would consist of pre-construction photos that document phases of the project. Photos and reports would document effects to the project area during construction and post-construction periods into the first growing season after implementation and subsequent seasons. When any aspect of restoration/revegetation is deemed to not be as successful as desired, the resource specialists would document any proposed follow-up work prescriptions needed to enhance the restoration effort.

Forest Plan Requirements

Monitoring is also conducted at the Forest level as part of the Forest Plan implementation, including monitoring of noxious weeds and best management practices. The monitoring of noxious weeds and invasive plants would be conducted where appropriate to track changes in populations over time and corrective action would be prescribed where needed. BMP monitoring is conducted on projects after treatment is complete (see Appendix A for more details on BMP monitoring). According to The National Best Management Practices for Water Quality Management on National Forest System Lands - Volume 1: National Core BMP Technical Guide (April 2012), monitoring is one of four steps outlined in the BMP process. Monitoring is used to inform and improve management activities and share with other appropriate Federal, State and local agencies. The Technical Guide states "The Forest Service Nonpoint Source Strategy uses "programmatic monitoring" to evaluate BMP implementation and effectiveness; that is, aside from project administration described above, BMPs are not monitored on every project or activity that occurs on National Forest System lands. Projects to monitor or specific monitoring sites are selected in a manner that results in objective and representative data on BMP implementation and effectiveness. Often, a random or systematic random selection procedure is used to choose monitoring locations across a forest or grassland where specific activities or BMPs are targeted." This project would go into a pool of similar projects to be selected for project level BMPs implementation and effectiveness monitoring as per the National BMP Monitoring Protocol. If selected an Interdisciplinary Team (IDT) would evaluate whether the site-specific BMPs were implemented and the effectiveness of the BMPs. Monitoring for each BMP is outlined in Appendix A: Best Management Practices for Water Quality Protection.

Other Monitoring Requirements

During government-to-government consultation with the Confederated Tribes of Warm Springs (CTWS), it was agreed that the Forest Service and CTWS would monitor huckleberry production within the project area, in particular new huckleberry production associated with the Nordic ski trail construction and rehabilitation. If the new huckleberry production does not increase, government-to-government consultation may be re-initiated to discussion mitigation measures to offset the permanent loss of huckleberries resulting from this project as required by the PDC.

Lastly, a traffic monitoring program would be developed in cooperation between Oregon Department of Transportation (ODOT) and MHM. The Master Plan (page A-16) requires that a traffic monitoring program be maintained at MHM to be able to determine the effectiveness of traffic mitigation measures and the correlation of ski area usage to the total traffic volume, in cooperation with ODOT. In addition, ODOT may require additional monitoring as part of the permitting process associated with the construction of the turn lanes and parking lot. ODOT has recommended that MHM develop a mechanism for monitoring the effectiveness of Transportation Demand Management (TDM) measures on traffic levels at key intersections, including what would be done if the TDM measures do not meet the anticipated levels.

2.5. Comparison of Alternatives

This section provides a summary of the alternatives by proposed activities. Table 2-1 compares the features of the Twilight Parking Lot proposed for each action alternative. Table 2-2 compares the features of the Sunrise Maintenance Shop for each action alternative. Table 2-3 compares the acres of disturbance associated with the connected actions. Lastly, table 2-4 compares the alternatives by the purpose and need components, proposed action elements, connected actions, and issues. Information in the tables focuses on activities and effects where different levels of effects could be distinguished quantitatively or qualitatively.

Table 2-1: Comparison of Twilight Parking Lot features for Action Alternatives

Parking Lot Feature	Alternative 2 (Proposed Action)	Alternative 3 (New Nordic Trails)	Alternative 4 (Elk Meadow Master Plan)	Alternative 5 (Elk Meadow)	Alternative 6 (Preferred Alternative)
Parking Lot Size	7.2 acres	7.5 acres	4.9 acres	6.8 acres	7.2 acres
Location	East of Elk Meadows trailhead; West of ODOT sand shed	East of Elk Meadows trailhead; West of ODOT sand shed	Between Elk Meadows trailhead & Nordic trails	Between Elk Meadows trailhead & Nordic trails	East of Elk Meadows trailhead; West of ODOT sand shed
Edges	Linear	Non-linear	Linear	Linear	Linear
Additional Parking Capacity	878 vehicles	915 vehicles	598 vehicles	830 vehicles	878 vehicles
Snow Storage & Storm Water Management Clearing	2.2 acres	6.3 acres	3.1 acres	4.5 acres	2.2 acres
Bus Shop Size	2.9 acres	2.9 acres	0 acres	2.5 acres	2.9 acres
Access Road Construction	500 feet 0.9 acres	470 feet 0.8 acres	300 feet 0.5 acres	370 feet 0.6 acres	500 feet 0.9 acres
Total Disturbance	12.5 acres	17.5 acres	8.5 acres	14.4 acres	13.2 acres

Table 2-2: Comparison of Sunrise Maintenance Shop features for Action Alternatives

Maintenance Shop Feature	Alternative 2 (Proposed Action)	Alternative 3 (New Nordic Trails)	Alternative 4 (Elk Meadow Master Plan)	Alternative 5 (Elk Meadow)	Alternative 6 (Preferred Alternative)
Location	North side of Sunrise Parking Lot	Adjacent to administration building	North side of Sunrise Parking Lot	North side of Sunrise Parking Lot	North side of Sunrise Parking Lot
Connection to Sunrise Parking Lot	Yes	No	No	No	No
Maintenance Building Clearing	1.8 acres	2.4 acres	2.3 acres	2.3 acres	2.3 acres
Access Road Construction	0 feet 0.0 acres	844 feet 1.0 acres	130 feet 0.2 acres	130 feet 0.2 acres	130 feet 0.2 acres
Total Disturbance	1.8 acres	3.4 acres	2.5 acres	2.5 acres	2.5 acres

Table 2-3: Comparison of the Connected Actions

Connected Action	Acres of Disturbance				
	Alternative 2 (Proposed Action)	Alternative 3 (New Nordic Trails)	Alternative 4 (Elk Meadow Master Plan)	Alternative 5 (Elk Meadow)	Alternative 6 (Preferred Alternative)
Turn Lane (New Disturbance)	0.5	0.5	0.5	0.5	0.5
Wetland Relocation	0.01	0.01	0.01	0.01	0.01
Nordic Trials	2.6	3.3	0.0	0.7	3.3
Sahalie Falls Trail Re-route	0.0	0.0	0.1	0.0	0.0
Total Disturbance	3.1	3.8	0.6	1.2	3.8

Table 2-4: Comparison of Alternatives by Purpose and Need Components, Proposed Action Elements, Connected Actions and Issues

Action	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (New Nordic Trails)	Alternative 4 (Elk Meadow Master Plan)	Alternative 5 (Elk Meadow)	Alternative 6 (Preferred Alternative)
Purpose and Need Components						
Provide for public and customer safety by improving parking capacity.	No change to parking capacity.	7.2 acres of additional parking	7.5 acres of additional parking	4.9 acres of additional parking	6.8 acres of additional	7.2 acres of additional parking
Provide additional parking, including area for snow storage, to serve the design capacity that was conceptually approved in the Master Plan ROD while also minimizing environmental impact from parking lot construction and maintenance.	No parking lot would be constructed.	The parking lot would be constructed east of the Elk Meadows trailhead and west of the ODOT sand shed with access via FS Road 3545.	The parking lot would be constructed in the same location as in Alternative 2. However, this parking lot would not have linear edges like Alternative 2.	The parking lot would be constructed between the Elk Meadows trailhead and existing nordic trails	The parking lot would be constructed in approximately the same location as Alternative 4.	Same as Alternative 2.
Separate the industrial bus parking and vehicle maintenance functions away from public areas at the Mt Hood Meadows Main Parking lot to further improve safety.	No vehicle maintenance shop would be constructed.	A vehicle maintenance shop would be constructed on the north side of the existing Sunrise Parking Lot.	A vehicle maintenance shop would be constructed adjacent to the existing administrative building site (Master Plan ROD p. 9).	A vehicle maintenance shop would be constructed near (and not connected to) the existing Sunrise Parking Lot and would be accessed from FS Road 3555.	Same as Alternative 4.	Same as Alternative 4.
Proposed Action Elements for Twilight Parking Lot						
Clearance for Parking Lot (New Paved Surface)	0 acres	7.2 acres	7.5 acres	4.9 acres	6.8 acres	7.2 acres
Clearance for Associated Snow Storage and Storm Water Management	0 acres	2.2 acres	6.3 acres	3.1 acres	4.5 acres	2.2 acres
Total Clearance, including parking, snow storage, and storm water management.	No additional clearing would occur within the Mt. Hood Meadows Permit Area.	9.4 acres	13.8 acres	8.0 acres	11.3 acres	9.4 acres
Twilight Equipment Maintenance Yard (Bus Shop)	No equipment maintenance yard or access road would be constructed	2.9 acres would be cleared for an equipment maintenance yard (bus and snow equipment parking and a shop building) and an access road.	Same as Alternative 2.	No new bus shop would be constructed. Bus and snow equipment parking and maintenance would occur at the Sunrise Maintenance Shop.	2.5 acres would be cleared for an equipment maintenance yard (bus and snow equipment parking and a shop building) and an access road.	Same as Alternative 2.
Access Roads to Twilight Parking Lot and Equipment Maintenance Yard	No access roads would be constructed.	The access road would be to the Twilight Parking Lot would be approximately 360 feet, and the access road to the Equipment Yard would be 140 feet. Both access roads would be 500 feet or 0.1 miles which is 0.9 acres of disturbance.	The access road would be to the Twilight Parking Lot would be approximately 330 feet, and the access road to the Equipment Yard would be 140 feet. Both access roads would be 470 feet or 0.1 miles which is 0.8 acres of disturbance.	The access road would be to the Twilight Parking Lot would be approximately 300 feet or 0.1 miles which is 0.5 acres of disturbance. No access road to the Equipment Yard would be constructed.	The access road would be to the Twilight Parking Lot would be approximately 300 feet, and the access road to the Equipment Yard would be 70 feet. Both access roads would be 370 feet or 0.1 miles which is 0.6 acres of disturbance.	Same as Alternative 2.

Action	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (New Nordic Trails)	Alternative 4 (Elk Meadow Master Plan)	Alternative 5 (Elk Meadow)	Alternative 6 (Preferred Alternative)
Nordic Guest Services Building	No change to the existing guest services building	A guest services building would be constructed within the Twilight Parking Lot location. The services to be included are: bathrooms, lockers, food and beverage services, guest seating, nordic equipment rental, and a covered bus stop. The approximate dimension of the guest services building would be 35x60 feet.	Same as Alternative 2.	Same as Alternative 2. The location moves to the new parking lot location.	Same as Alternative 2. The location moves to the new parking lot location.	Same as Alternative 2.
Proposed Action Elements for Sunrise Maintenance Shop						
Clearance for Maintenance Building (New Paved Surface)	0 acres	1.8 acres	2.4 acres	2.3 acres	2.3 acres	2.3 acres
Access Road to Sunrise Maintenance Building	No access roads would be constructed.	No access road would need to be constructed.	An 844-foot or 0.2 miles access road would need to be constructed which is 1.0 acre of disturbance.	A 130-foot or 0.02 miles access road would need to be constructed which is 0.2 acres of disturbance.	Same as Alternative 4.	Same as Alternative 4.
Total Clearance	No additional clearing would occur within the Mt. Hood Meadows Permit Area.	1.8 acres	3.4 acres	2.5 acres	2.5 acres	2.5 acres
Connected Actions						
Utility Lines – power, water, sewer, and telephone	No change to the existing utility lines	Utility lines would be buried under an existing trail from the existing nordic Center to the Twilight Lot in two 36-inch deep trenches separated by at least 10-feet following existing clearings. A 1,750-foot water line would also be dug into the same corridor as an existing powerline from the Administrative Building and a shorter sewer line extended into the Sunrise Lot.	Same as Alternative 2.	Same description as Alternative 2, but a shorter distance. A 400-foot water line would also be dug from the Administrative Building and a 1,000-foot sewer line would be dug into the roadway of the main parking lot	Same as Alternative 4.	Same as Alternative 2.

Action	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (New Nordic Trails)	Alternative 4 (Elk Meadow Master Plan)	Alternative 5 (Elk Meadow)	Alternative 6 (Preferred Alternative)
Turn Lanes to Mt. Hood Meadows Access Road (FS Road 3545).	No left or right turn lanes would be constructed on Highway 35.	Left and right turn lanes with adequate vehicle storage for north and south bound traffic would be constructed at the intersection of Highway 35 and FS Road 3545. Total disturbance of these turn lanes would be 3.3 acres (0.5 acres of new disturbance).	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Wetland Relocation	Existing wetlands remain unchanged. No wetland restoration would be completed.	Right-turn lane would impact less than an acre of existing wetlands adjacent to Highway 35. To mitigate this impact, a new wetland would be created in approximately the same location relative to the newly constructed right-turn lane (0.01 acres). As a result, there will be no net loss in wetlands.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Nordic Trails	No change to existing nordic trails	Approximately 2,746 feet (0.5 miles; 2.6 acres) of nordic ski trails would be constructed so that there would be no net loss of ski trails.	Approximately 3,432 feet (0.7 miles; 3.3 acres) of nordic trails would be replaced in-kind approximately in the location between the new proposed parking lot and the existing lot.	No change to existing nordic trails	Approximately 870 feet (0.2 miles; 0.7 acres) of nordic trails would be relocated to avoid the parking lot and bus shop.	Same as Alternative 3.
Sahalie Falls Trail (FS Trail #667c)	No change to the existing trail or trail head parking.	No change to the existing trail or trail head parking.	No change to the existing trail or trail head parking.	The Sahalie hiking trail would be re-routed around the proposed parking lot to provide screening. The re-route (650 feet; 0.1 miles) parallels the existing route. The trail would remain a Class 3 trail for bike use. No change to the existing trail head parking. Approximately 0.1 acres of additional disturbance.	The Sahalie Falls hiking trail would be re-routed and coincide with the proposed existing and new Nordic trails. The re-route (1500 feet) would remain a Class 3 trail for bike use. There would be no change to the existing trail head parking, and no additional disturbance associated with this re-route.	No change to the existing trail or trail head parking.
Overall Impact						
Acres of New Paved Surfaces [3]	0.0 acres	13.3 acres	15.1 acres	8.4 acres	12.9 acres	14.0 acres

Action	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (New Nordic Trails)	Alternative 4 (Elk Meadow Master Plan)	Alternative 5 (Elk Meadow)	Alternative 6 (Preferred Alternative)
Total Acres of Impact (not including previous disturbed areas) [4]	0.0 acres	18.1 acres	24.7 acres	11.6 acres	18.1 acres	19.5 acres
Acres of Forested Land Removed	0.0 acres	16.0 acres	22.0 acres	9.4 acres	17.0 acres	10.7 acres
Issue #1 – Concerns Regarding Consistency to the 1997 Master Plan ROD						
Consistency with the Master Plan ROD – Twilight Parking Lot, including Twilight Equipment Maintenance Yard	Consistent for parking	Parking is inconsistent because parking, storm water management and snow removal exceed 8-acres.	Parking is inconsistent because parking, storm water management and snow removal exceed 8-acres.	Parking is consistent because parking, storm water management, snow removal total 8 acres.	Parking is inconsistent because parking, storm water management and snow removal exceed 8-acres.	Parking is inconsistent because parking, storm water management and snow removal exceed 8-acres.
Consistency with the Master Plan ROD – Sunrise Maintenance Shop	Consistent for maintenance building	Maintenance building is consistent because less than 3.0 acres of disturbance.	Maintenance building is inconsistent exceeds 3.0 acres for disturbance.	Maintenance building is consistent because it exceeds 3.0 acres for disturbance.	Maintenance building is consistent because it is less than 3.0 acres of disturbance.	Maintenance building is consistent because it exceeds 3.0 acres for disturbance.
Additional Parking Capacity	No additional capacity	878 vehicles	915 vehicles	598 vehicles	830 vehicles	878 vehicles
Total Parking Capacity (Assumes 122 vehicles per acre)	2,647 vehicles (existing condition)	3,526 vehicles	3,562 vehicles	3,245 vehicles	3,477 vehicles	3,526 vehicles
Issue #2 – Concerns Regarding the Effects of Loss of Miles of Nordic Skiing and Change to the nordic Skiing Experience						
Difficulty Rating (Easiest, Intermediate and Most Difficult)	25% Easiest 70% Intermediate 5% Most Difficult	20% Easiest 75% Intermediate 5% Most Difficult	19% Easiest 76% Intermediate 5% Most Difficult	25% Easiest 70% Intermediate 5% Most Difficult	25% Easiest 70% Intermediate 5% Most Difficult	19% Easiest 76% Intermediate 5% Most Difficult
Description of experience	Undulating, beginner trails	Removed: 2746-feet of trail would be removed from the Hanel and Little Loops on undulating terrain. Replaced: The same amount would be constructed. Straight, uniform terrain. The outer loop is no longer continuous.	Removed: 3432-feet of trail would be removed from the Hanel, Bear Grass, and Little Loops on undulating terrain. Bear Grass trail through wooded area. Replaced: 3432-feet of trail would be constructed on similar undulating terrain. Replacement for the Bear Grass trail would be open and exposed to parking lot. The outer loop is no longer continuous.	Removed: Only 280-feet of trail would be removed from the East Access trail. Replaced: No change to the experience. The outer loop is no longer continuous.	Removed: 870-feet of trail would be removed from the East Access trail. Replaced: No change to the experience. The outer loop is no longer continuous.	Removed: 3432-feet of trail would be removed from the Hanel, Bear Grass, and Little Loops on undulating terrain. Bear Grass trail through wooded area. Replaced: 3432-feet of trail would be constructed on similar undulating terrain. Replacement for the Bear Grass trail would be open and exposed to parking lot. The outer loop is no longer continuous.
Other Concerns						
Water Quality and Quantity: Total percentage of sub-watershed in impervious surfaces.	3.0% Meadows Creek 7th Field 1.2% Headwaters of East Fork Hood River 7th Field	4.1% Meadows Creek 7th Field 1.3% Headwaters of East Fork Hood River 7th Field	4.5% Meadows Creek 7th Field 1.3% Headwaters of East Fork Hood River 7th Field	3.7% Meadows Creek 7th Field 1.3% Headwaters of East Fork Hood River 7th Field	4.2% Meadows Creek 7th Field 1.3% Headwaters of East Fork Hood River 7th Field	4.2% Meadows Creek 7th Field 1.3% Headwaters of East Fork Hood River 7th Field

Action	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (New Nordic Trails)	Alternative 4 (Elk Meadow Master Plan)	Alternative 5 (Elk Meadow)	Alternative 6 (Preferred Alternative)
Water Quality and Quantity: Acres of Riparian Reserve disturbed	0.0 acres	3.7 acres	4.8 acres	4.2 acres	4.2 acres	3.8 acres
Water Quality and Quantity: Overall Impact	No Increased Risk	Increased Risk of Sediment	Risk of Some Increased Water Temperature; Risk of Some Increase of Sediment; Risk of Some Chemical Contaminant	Increased Risk of Sediment	Increased Risk of Sediment	Increased Risk of Sediment
Huckleberry Removal: Acres of huckleberry plants permanently eliminated	0.0 acres	10.0 acres	14.0 acres	7.0 acres	10.3 acres	11.3 acres
Northern Spotted Owl Suitable Habitat: Acres of suitable habitat removed.	0.0 acres	9.6 acres	13.1 acres	4.1 acres	9.8 acres	9.9 acres

2.6. Alternatives Considered, but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Alternative 2 (Proposed Action) as well as the preliminary effects analysis conducted by the interdisciplinary team suggested alternative methods for achieving the purpose and need. Some of these alternatives were outside the scope of this EIS, did not meet the purpose and need for action, were not reasonably feasible or viable, were duplicative of the alternatives considered in detail, or were determined to cause unnecessary environmental harm. Four alternatives were considered, but eliminated from detailed consideration for reasons summarized below.

2.6.1. Highway 35 Temporary Bypass Repurpose Alternative

This alternative would utilize the south end of the Clark Creek-Newton Creek segment of the U.S. Department of Transportation, Federal Highway Administration (FHWA) Highway 35 Betterment Project for parking, rather than building a new parking lot within the MHM permit area. To carry traffic during the construction of the permanent elevated Highway 35, a paved temporary road was constructed in close proximity to the proposed parking lot. The temporary road is approximately two miles long and 28feet wide. As part of the Highway 35 Betterment project, approximately 2000 feet of this temporary road will be used to extend the existing Teacup Sno-Park and the remaining temporary road will be removed and rehabilitated. Rather than removing any of the temporary road, this alternative would connect the Teacup Sno-Park to the Pocket Creek Sno-Park, creating an elongated parking lot to accommodate downhill and Nordic skiers. It is estimated that this parking lot could accommodate up to an additional 800 head-in parking spaces. This alternative was proposed during the public scoping period that was conducted in August 2011. Additional details on this proposal, including maps, are available in the project record located at the Hood River Ranger District in Mount Hood-Parkdale, Oregon.

This alternative was eliminated from detailed study because it does not meet the purpose and need for action, is not reasonably feasible or viable, and was determined to cause unnecessary environmental harm. The Forest Service discussed this alternative with members of the public proposing this alternative as well as FHWA and ODOT. In addition, the Forest Service analyzed the design/construction elements, safety concerns and geomorphic/hydrologic impacts associated with this alternative. Based on this analysis, the following issues were identified.

Public Safety

- Plowing snow from Highway 35 onto the parking lot below the elevated section of the highway would be a safety hazard, according to ODOT who is responsible for plowing operations. While plowing Sno-Parks is generally done at night, plowing to keep Highway 35 open during the day often occurs and could pose a hazard from snow, rocks and debris being thrown onto recreationists and vehicles located in the parking area below.
- Even if MHM shuttles were to service this location, the turning and u-turning movements of the shuttle busses would impact and impede traffic driving through the area and visitors trying to park. This alternate parking proposal would also introduce more traffic conflicts due to visitors parking and un-parking along the highway, and would increase the amount of

pedestrians accessing trails or shuttles along and across Highway 35. In addition, if MHM did not provide a shuttle service to this location, people would be crossing the highway at various locations over this two mile stretch and possibly even walking on the highway, leading to more opportunities for pedestrian-vehicle encounters, which could result in severe injuries or even fatalities.

Design/Construction

- Fill material from the detour road is designed to be used as fill for the new elevated portion of the highway. Current design calls for removal of the detour road and to add fill on the shoulder of the road at a 1:4 slope. In a number of locations, filtration trenches are designed into the fill slope to handle storm water runoff. If the shoulders were eliminated, permanent vertical retaining wall would need to be designed for both the elevated portion of the highway and the detour road. More clearing is likely needed to construct the retaining walls for the detour road. To minimize clearing, fill slopes could be eliminated; however, a new design would need to incorporate storm water filtration. If vertical walls were not used for either the detour road or the highway more clearing would be required to obtain the designed fill slope of 1:4.

- To accommodate the proposed alternative one of the following options may need to be considered: 1) The detour road would have to be elevated to the same level as the elevated portion of the highway and box culverts extended to properly function; 2) If the parking is maintained at the same level of the detour road, then a swell/depression/channel would have to be constructed at the outlet of the box culverts to allow for a free flowing outlet. This option would segment the parking and additional ingress and egress would have to be considered. Additionally, these swells may not handle a large flood and debris flow event and could overflow and inundate the proposed parking areas; or, 3) Elevate the detour road at the culvert locations only and extend the culverts. Regardless of the options, extensive design work would need to occur; this design could take up to one year to complete and would be very costly.

Geomorphic/Hydrologic

- The dynamic nature of the large debris flow depositional fan that spans from Clark Creek through the Newton Creek area has been documented numerous times in the past. This area has been the site of many large debris flows, with a recent increase in activity over the last few decades. This increase is due primarily to glacial retreat on Mt. Hood that has exposed large, steep glacial moraines composed of unsorted, unconsolidated material. These exposed moraines are very susceptible to slope failure from moderate to large rain events or rain-on-snow events. Highway 35 has been damaged several times in the last two decades from these debris flows, due to its alignment bisecting the debris flow paths. The current Highway 35 Betterment Project is an attempt to address issues associated with this dynamic landscape. This project would elevate Highway 35 approximately 4 feet through the Clark/Newton Creek area, and install a series of oversized drainage structures and water conveyance structures to deal with the debris flow materials. Utilizing the old Highway 35 template as a parking area would continue to expose this structure to damage from these debris flows.

As outlined in the safety concerns above, this alternative does not meet the overall purpose for this project to "to improve public and customer safety" as stated in Section 1.3. Also, this alternative is not located within the MHM permit area as stated as part of the purpose and need for action. Section 1.3 states: "The geographic scope of the project includes the Mt. Hood Meadows Ski Resort permit area and access road to the permit area." In addition, this alternative

is not reasonably feasible or viable as outlined in the design/construction concerns, without significantly impacting and changing the Highway 35 Betterment project. Lastly, this alternative would cause unnecessary environmental harm as outlined in the geomorphic/hydrologic concerns. As such, this alternative was not considered further.

2.6.2. Bear Grass Loop Parking Lot Alternative

This alternative would construct the Twilight Parking Lot near the ODOT maintenance shed on the Bear Grass Nordic ski loop. Bear Grass Loop is the lowest elevation Nordic ski trail that is often ungroomed, and hence, skied less than the other adjacent trails. The proposal retains the "best" Nordic ski trails in the MHM system, puts the Nordic guest services building at the bottom of the trail system, and better connects the east and west sides of the trail system. This alternative was proposed during the public scoping period that was conducted in August 2011. Additional details on this proposal, including maps, are available in the project record located at the Hood River Ranger District in Mount Hood-Parkdale, Oregon.

The proposed parking lot location is adjacent to Clark Creek. Much of the northern edge of the proposed parking lot is within 300-feet of the Riparian Reserve of Clark Creek with the closest point within 100-feet of the creek. The proximity to Clark Creek raises geomorphic and hydrologic concerns similar to those discussed in the previous alternative. The dynamic nature of the large debris flow depositional fan that spans from Clark Creek has been documented numerous times in the past. Field surveys by a fisheries biologist and hydrologist revealed that there was depositional activity in the proposed parking lot location. The portion of proposed parking lot outside the Clark Creek Riparian Reserve would only be approximately four to six feet higher than Clark Creek. Given the flashy flow regime and increased chance for debris flows in this stream system due to its glacial source, the proposed parking lot would be susceptible to damage given a flood or debris flow event. Remant channels in the area, including one located at the northwestern corner of the proposed lot, demonstrate that Clark Creek can avulse towards the proposed parking lot. This activity had created several stream channels that were wet indicating the presence of perennial streams. In addition, the surveys revealed flowing water in a well-defined swale or channel on the east portion of the proposed parking lot. Based on the presence of riparian dependent vegetation, it is assumed that some water is present at the surface or ground water year round. Also, there are other swales in the area. Lastly, several wetlands were identified within the project area. One of the wetlands would be removed through the construction of the proposed access road.

Additionally, the primary purpose for proposing this location is to minimize the impacts to the Nordic ski trails and Nordic skiing experience within the MHM permit area. Specifically, the proponent of this alternative stated: "While [the Twilight Parking Lot] proposes to add 0.42 miles of trails to re-connect areas bisected by the parking lot, it does not replace the nice undulating terrain of Hanel and Little Loop trails that the proposed parking lot would cover over." Similar comments were received from other members of the public. Alternatives 4 and 5 were designed to address the comments from the Nordic ski community. Alternatives 4 and 5 change the location of the proposed Twilight Parking Lot to between the Elk Meadows trailhead and existing Nordic ski trails, as recommended by this alternative. As a result of changing locations, Alternative 4 does not impact any of the existing Nordic ski trails and Alternative 5 only impacts 0.2 miles of the East Access trail. The impacted trails in Alternative 5 would be relocated and the recreational experience would be duplicated.

This alternative would cause unnecessary environmental harm, plus the proposed alternative is duplicative of the alternatives considered in detail. As such, this alternative was not considered further.

2.6.3. HRM Expansion Alternative

This alternative would build out the existing Hood River Meadows (HRM) parking lot to improve parking capacity, rather than constructing a separate parking lot. The parking lot could be expanded into the existing plantations. This alternative would minimize the new disturbance because it would utilize the snow storage and storm water management associated with the existing parking lot. The existing parking lot is 8.0 acres, plus an additional 4.2 acres for snow storage and storm water management. The parking lot has a capacity of 976 vehicles (122 vehicles per acre). This alternative was proposed by both the interdisciplinary team as well as members of the public during the scoping period that was conducted in August 2011.

Field reviews and discussions with MHM revealed that the area proposed for the parking lot include a septic drainage field, consisting of three or four drain lines that are snaked through the trees. This septic system services the current Nordic skier services building septic tank. Moving the drainage field to accommodate this alternative would be cost prohibitive, and would result in additional acres of disturbance because the drainage field would have to be relocated. As such, this alternative is not reasonably feasible or viable and was not considered in detail.

2.6.4. Mass Transit Alternative

This alternative would use mass transit and alternate forms of transportation to improve public and customer safety and improve traffic flow at Mt. Hood Meadows Ski Resort by reducing the number of vehicles parked at MHM at any time, rather than building another parking lot. Several scoping comments suggested using shuttles from local businesses, increasing the number of shuttles, increasing the shuttle frequency, and price incentives.

The underlying needs for completing this project (Section 1.3) are to: provide for public and customer safety by improving parking capacity; and provide additional parking, including area for snow storage, to serve the design capacity that was conceptually approved in the Record of Decision for the Mt. Hood Meadows Ski Area Master Plan published in 1997, while also minimizing environmental impact from parking lot construction and maintenance. As such, any alternative that does not provide additional parking does not meet these underlying needs for this project. Therefore, this alternative is outside the scope of this project and not considered any further. Although the alternative is not considered further in this EIS, the Master Plan requires MHM to utilize alternate forms of transportation and the construction of this parking lot would not change these requirements or the current incentives being offered by MHM.

The Master Plan authorized 4,600 vehicles with 30.5 acres of parking, resulting in 12,500 people-at-one-time (PAOT). Over time, the size of vehicles has increased and the number of people travelling in the vehicles has decreased. As a result, even the largest parking lot alternative (Alternative 3), does not meet the number of vehicles or PAOT authorized in the Master Plan. Alternative 3 would result in 3,545 vehicles with 29 acres of paved parking lots, resulting in 8,860 PAOT. (For more information, see Section 3.1, Recreation.) As such, all action alternatives are meeting the desired future condition for transportation. The desired future condition states:

"Limit the amount of parking authorized as a means to promote alternative transportation modes, to minimize the land area committed to development, and to respond to public and agency concerns about increased traffic congestion on US 26" (ROD, page 9).

In addition, the Master Plan provides further direction on alternate forms of transportation. Specifically, related to the construction of an additional parking lot as part of the base area expansion (e.g., Twilight Parking Lot), the Master Plan (ROD, page 10-11) states: "Using current vehicle occupancy figures, the 8 acres would accommodate approximately 12,500 PAOT. To accommodate the 13,900 PAOT capacities allowed for other facilities, alternative forms of transportation will need to be utilized, i.e., increased carpooling, increased busing, mass transit." Also, the standards and guidelines in Appendix A of the Master Plan state: "MHM is encouraged to implement a variety of ski area operational measures to mitigate traffic include:

- Continue the program with Hood River retailers for food/beverage discounts at Hood River restaurants.
- Continue price incentives for off-peak skiing.
- Continue promotional packages that sell combinations of lift tickets and bus transportation.
- Maintain the reader board along Forest Road 3555 to advice departing drivers of travel times on Highway 35 verses Highway 26.
- Continue to actively promote the use of Highway 35 as an alternative to Highway 26.
- Expand night skiing to help reduce peak hour arrivals/departures" (pages A-16 to A-17).

Based on this management direction, MHM is required to continue using and growing alternate forms of transportation in order to reach the PAOT authorized in the Master Plan. For the 2012-2013 ski season, MHM continued its transportation incentive program to curb peak day parking issues. In a press release, MHM states: "The multi-faceted initiative includes subsidizing transportation programs to the mountain, increasing employee shuttle bus routes, promoting ride sharing and create peak day pricing. The initiatives are intended to significantly reduce or possibly eliminate the number of days the resort reaches parking capacity." Specifically, MHM is implementing the following initiatives:

- Subsidized Bus and Lift Packages: MHM reduces the price of shuttle rides to the resort. The resort will increase the number of park and ride shuttles operating on peak days from one to four, and also offer the reduced pricing to all guests purchasing MHM multi-day ski and snowboard programs. The subsidized pricing is expected to increase bus ridership by 25% this season, and provide an additional 300 seats on peak days which would remove more than 100 vehicles traveling to the resort those days.

- Rescheduling Competition and Race Events: MHM can reduce another 100 vehicles on peak days by rescheduling competitive and race events to off-peak days or different times on peak days.

- Employee Transportation: MHM will increase the number of employee shuttle bus routes and offer more flexible shuttle bus schedules and pick-up points. The target is to reduce an additional 150 vehicles per peak day off Highway 35 in the 2012-2012 season.

- Carpooling: Drive Less Connect is promoted on SkiHood.com to guests to find others traveling to MHM – and ultimately reduce the amount of vehicles traveling to the resort.

- Information Sharing: MHM provides timely parking updates on its conditions page, snow report and twitter tweets, anticipating days when parking may be an issue and recommending guests alter their arrival times to the resort to avoid parked out lots. MHM will increase the number of variable message signs mounted on mountain ready vehicles located at the intersections of MHM access roads and Highway 35 to provide current traffic information messages as directed by ODOT staff.
- Peak Day Pricing: Lift ticket pricing will be higher on peak days. The additional costs of a peak day should serve as an incentive to drive peak day traffic to off-peak time frames. MHM is also making pre-purchased tickets less available on peak days, which should result in more people making plans to recreate on off-peak time frames.
- Third Party Transportation Services: MHM partners with third party transportation services, offering season pass incentives and special lift pricing for passengers.
- Après Ski: MHM Vertical and Alpenstube Restaurants offer Après Ski promotions from 3pm to 6pm, helping to spread out the egress from MHM.

Because this alternative is outside the scope of this project and alternative forms of transportation are already required and being utilized by MHM, it was not considered any further

Chapter 3 - Affected Environment and Environmental Consequences

3.0. Affected Environment and Environmental Consequences

Effects include ecological (i.e., the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative (40 CFR 1508.7 and 1508.8).

This chapter presents information on the physical, biological, social, and economic environments of the affected project area, and the potential direct, indirect and cumulative effects to those environments due to the implementation of the alternatives. Each resource area discloses the direct, indirect and cumulative effects for that resource area.

The National Environmental Policy Act defines these as:

- **Direct**: Effects which are caused by the action and occur at the same time and place
- **Indirect**: Effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable
- **Cumulative**: Impacts that result from the incremental impact of an action, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions

The Environmental Assessment herby incorporates by reference the project record (40 CFR 1502.21). The project record contains specialist reports, biological evaluations, and other technical documentation used to support the analysis and conclusions in this Environmental Assessment. Specialist reports were completed for vegetation resources, transportation resources, geology, soils, water quality, fisheries, wildlife, botany, invasive plants, recreation, visual quality, fuels, and heritage resources. Separate biological evaluations were completed for botanical species, aquatic species, and terrestrial wildlife species. Full versions of these reports are available in the project record, located at the Hood River Ranger District office in Mount Hood/Parkdale, Oregon.

Each of the specialist reports and biological evaluations conduct an analysis of cumulative effects resulting from this project. Table 3-1 lists the projects that the IDT considered in their analysis.

Table 3-1: List of Projects Considered in Cumulative Effects Analysis

Past Activities
Annex Wetland Restoration at Sunrise
Bluegrass Ridge and Dollar Lake Complex Fires
Past Mt. Hood Meadows Ski Area Projects, including paving Sunrise and Hood River Meadows parking lots
Sahalie Falls bridge stabilization
Stadium Lift, Blue Wetland Enhancement and Access Road Culvert Replacement
Ongoing Activities
Avalanche Control
Existing Parking Lot Maintenance, including snow storage and snow removal

Table 3-1: List of Projects Considered in Cumulative Effects Analysis (Continued)

General Road Maintenance, including winter road treatments
General Ski Area Activities (e.g., ski run maintenance, trail grooming, hazard tree removal, and sign replacement)
Highway 35 Betterment Projects
Highway 35, Forest Service Road 3555 and 3545 Sanding for Vehicle Traction
Meadows Creek Highway 35 and Teacup Roads Culverts Replacement
MHM Administrative Building Operation and Maintenance
Oregon Department of Transportation (ODOT) Sand Shed Operation and Maintenance
Pre-commercial Thinning
Teacup Grooming Activities
Future Activities
Buttercup Lift Improvements
Meadows Creek Highway 35 and Teacup Road Culverts

3.1. Recreation

More information is available in the project record including the full recreation analysis file, as part of the Recreation Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.1.1. Analysis Assumptions and Methodology

The effects analysis for this report is based on published information, field surveys, and professional experience. The area used for analysis is the Mt Hood Meadows Permit Area (Permit Area), surrounding sno-parks and Nordic ski trails (i.e., Teacup and Bennet Pass). Analysis of the project area was completed by using Geographic Information System (GIS) data maintained by the Mt. Hood National Forest (the Forest). Professional judgment was incorporated in determining the effects on the recreational experience. On the ground analysis was obtained by both walking and cross-country skiing the project area. Past projects relating to ski resorts parking expansions on the Forest were reviewed. Similar projects at Montana Snowbowl, Mt. Ashland, and Bear Valley Mountain Resort were also reviewed. A complete citation for all agency work is provided under the References section of this document.

An occupancy rate of 2.5 occupants per personal vehicle was used in this analysis. An occupancy rate of 30 passengers per bus use was similarly used. These rates were used in the Master Plan (1997) and are included in the Mt. Hood Meadows Traffic Monitoring Report (Kittelson & Associates, inc. 2009). A lower occupancy rate of 1.16 occupants per vehicle (US 26) was identified by The Oregon Department of Transportation (ODOT) in their 2007 report entitled "Oregon Passenger Vehicle Occupancy Rates for Urbanized Highways and City Streets, by Functional Class." The source of this data is accident reports of crashed vehicles; therefore, the data may not be as reliable as other survey data. The 2009 National Household Travel Survey published by U.S. Department of Transportation, Federal Highway Administration, was also reviewed. It reported vehicle occupancy (based on the mean) of 2.21 occupants per vehicle for transportation used on social/recreational trips. This data did not incorporate site specific variables at Mt. Hood Meadows, such as price incentives, carpooling program (carpoolmatchnw.

org) and proximity to the urbanized population center (Portland). Professional judgment, therefore, was used to incorporate the occupancy rate of 2.5 occupants per vehicle as per the recommendation in the 1997 Master Plan.

Overall guidance was obtained from Land and Resource Management Plan (LRMP) Mt. Hood National Forest (USDA 1990), Mt. Hood Meadows Ski Area Master Plan (USDA 1997), The National Forest Ski Area Permit Act of 1986, and Forest Service Manual 2300 as it relates to Winter Recreation and Ski Areas (USDA 2006).

Factors being analyzed include:

a. Downhill Ski Area Operations
b. Nordic Ski Operations
c. Ski Area Parking (Demand - Peak Days)
d. FS System Trails
e. Dispersed Recreation
f. Recreation Opportunity Spectrum (ROS)

3.1.2. Existing Condition

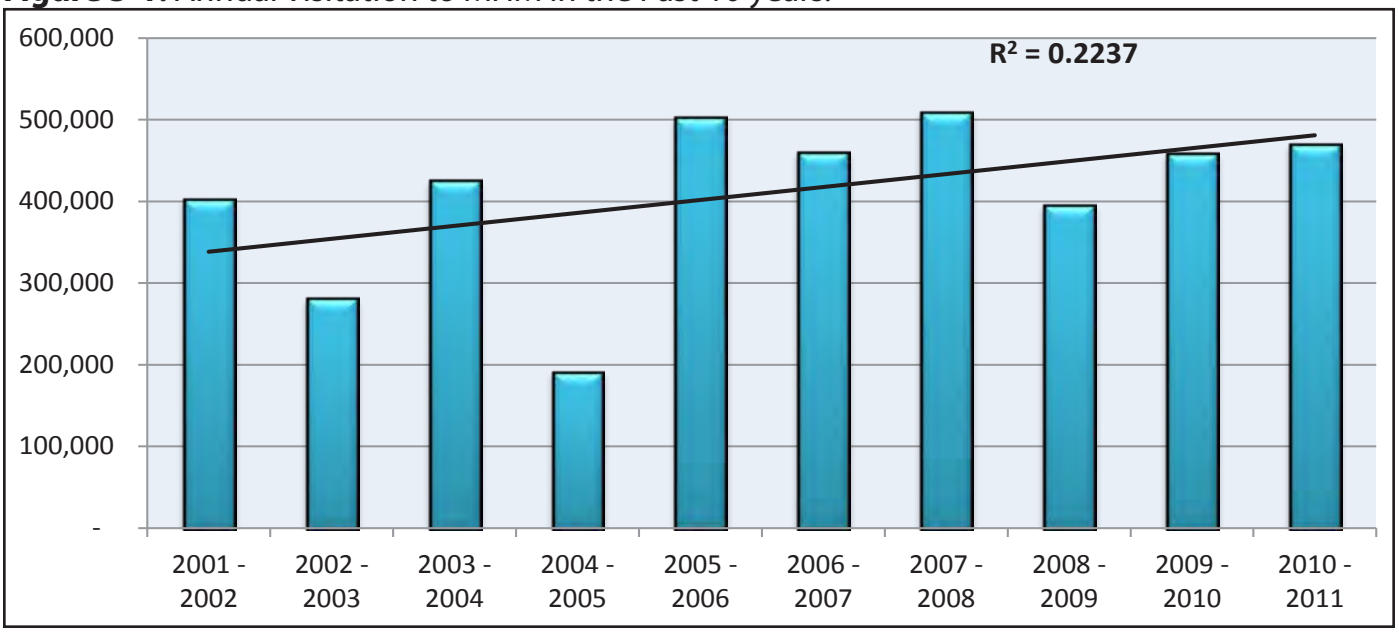
The Forest Service's National Visitor Use Monitoring (NVUM) program indicated that 15.6 percent of the recreation visitors to the National Forest System participated in activities listed under the category of downhill skiing. Results from the field data yield an estimated total of over 173 million recreation visits to National Forests. The two most common primary recreational activities are hiking/walking and downhill skiing. Just over 57 percent of visitors (about 99.6 million visits) engage in a primary activity that is physically active, which contributes significantly to American efforts to stay healthy.

Downhill Ski Area Operations

Currently a Service-wide Memorandum of Understanding (MOU) exists between the National Ski Areas Association and the United States Department of Agriculture Forest Service (FS Agreement No. 07-SU-11132424-246). One of the intents of this agreement is to provide developed recreation opportunities that help to improve the quality of life, provide health and fitness benefits, and afford healthy interaction with the natural environment (USDA 2008). With nearly the entire available and suitable downhill ski terrain around Mt. Hood located on the National Forest, the Forest Service has endeavored to provide a high quality downhill ski experience that is in balance with other recreational opportunities provided around Mt. Hood, economically feasible and within the environmental capacity of the land to withstand the level of development.

Growth in downhill skiing has occurred at MHM. Since opening in 1967/68, the number of skier visits has grown from 55,564 to over 500,000. During the 1970s the average annual rate of growth was twice the Oregon average at 4.6 percent. From 1984 to 1989, the average annual rate of growth has been 2.14 percent, with an annual average of 325,000 skier visits. During the 2007-2008 ski season, the number visitations at MHM peaked at over 500,000 visits. The 10-year average for annual visitation from 2001-2011 was 409,514 and the three year average from 2008-2011 was 441,108 visits. Based on this trend, use of the ski area is expected to continue to increase.

Figure 3-1: Annual Visitation to MHM in the Past 10 years.



*In statistics, the coefficient of determination R2 is used in the context of statistical models whose main purpose is the prediction of future outcomes on the basis of other related information.

The ski development has grown to 87 trails with the longest run being 15,840 feet. MHM currently consists of 2,150 skiable acres with the total of 13 ski lifts (6 high speed quads, 5 double chairlifts, and 2 snow conveyers). The uphill lift capacity is 16,145 people per hour. MHM is currently operating within the designed capacity of 13,900 (13,100 alpine, 800 Nordic) People At One Time (PAOT) for winter use as is authorized within the Master Plan. Designed capacity (authorized of winter use) is based on several factors, including the number of ski lifts and acres of ski trails. It is not an overall target for development and environmental factors may necessitate lower levels of development. PAOT is a quantified number of individuals that could be using the facilities at MHM at the same time.

Nordic Ski Operations

The Forest Service's National Visitor Use Monitoring (NVUM) program indicated that 3.8 percent of the recreation visitors to the National Forest System participated in cross-country skiing. MHM currently manages 15 kilometers (or 9.32 miles) of groomed Nordic trails on the Forest. They provide grooming for both skate and touring skies. The trails traverse rolling hills (undulating terrain) at the base of Mt. Hood providing great opportunities for skiers of all skill levels (see table below). The trails pass through natural appearing stands of Doug-fir, silver-fir and hemlock. A buffer of trees between the trails and the developed downhill ski area provides a greater sense of skiing through a more natural environment and a sense of separation from the downhill uses. Eleven trails of different distances and degrees of difficulty provide a great resource for a full day of Nordic skiing. The Heather Canyon Trail and the East Access Trail are shared between Nordic skiers, downhill/backcountry skiers and snowboarders. Sahalie Falls Road is also incorporated into the Nordic trail system during the winter months. Sahalie Falls itself is often a primary destination for new visitors to the area and a highlight for many. The Hood River Meadows Trail along with the Sahalie Falls Road serves as the primary destination for novice skiers as they are rated in the easiest difficulty category. These two trails are also used by MHM employees to instruct students in Nordic skiing.

Table 3-2: Existing Length of Nordic Trails by Difficulty Ratings.

Difficulty	Length	% of Trail System
Easiest	3.8 km (2.3 miles)	25%
Intermediate	10.5 km (6.5 miles)	70%
Most Difficult	0.8 km (0.5 mile)	5%

During the past two ski seasons visitation to MHM Nordic trail system has nearly doubled. An annual visitation of 2,759 was recorded for the 2009-2010 season. During the 2010-2011 season, 5,207 visits were recorded. As of February 2012, 3,634 visits had already occurred. Based on this trend, use of the Nordic trail at MHM ski area is expected to continue to grow.

Teacup Lake Nordic trail system is located to the southeast of the Nordic trails at MHM. The two trail systems are currently separated by Highway 35. Teacup offers 20 km (12 miles) of groomed trails. Several other un-groomed Nordic trails are also available in the surrounding area. Nordic skiing continues to be a very popular winter recreation activity on the Forest; however, visitation for downhill skiing and snowboarding is by far the most popular and the main attraction within the MHM permit boundary.

Ski Area Parking (Demand - Peak Days)

There is generally adequate parking within the three parking areas at MHM during weekdays. During peak use days, generally occurring on holidays and weekends, all three of the existing parking lots near capacity and/or reach their maximum capacity. As the lots fill, roadside signs inform visitors as to which lots to use. Users are guided by parking lot attendees to appropriate areas and generally walk or take shuttle buses to the needed facilities or ski lift access. On peak use days this experience can involve a long walk from the back of the lots carrying downhill equipment. In the event that the parking areas reach maximum capacity users are turned away. These visitors have continued to attempt to find additional parking in other less desirable and potentially dangerous locations, such as alongside Highway 35 or FS Road 3545.

MHM currently provides parking at three parking areas: 1) Main Lodge Base; 2) Sunrise Annex Lot; and, 3) Hood River Meadow Lot (HRM). Stormwater management and snow storage are incorporated into the design the existing parking. Including the areas used for stormwater and snow storage, the total area cleared to facilitate parking is 35.8 acres (see table below). 21.8 acres of this are used solely as space for parking. In addition to the on-site parking, extensive shuttle services are offered to bring people to the resort. The Master Plan estimated that in addition to on-site parking, 1,400 PAOT would need to use alternative form of transportation (including mass transit) to reach the ski resort's design capacity.

Table 3-3: Existing Acres of Parking at MHM.

Parking Lot	Parking Lot Size	Stormwater Management	Snow Storage	Total
Main Lodge Base	10.0	0.7	4.6	15.3
Westside Base Expansion (Sunrise Annex Lot)	3.8	0.7	3.8	8.3
Hood River Meadows Base (HRM)	8.0	0.7	3.5	12.2
Total	**21.8**	**2.1**	**11.9**	**35.8**

The numbers of reported vehicles during the 2011-2012 ski season was 2,639 vehicles parked at one time or approximately 121 vehicles per acre. At 2.5 persons per car, the three lots actually parked 6,598 people at one time (PAOT). The Master Plan estimated parking for 4,600 vehicles within 30.5 acres of parking (see table below) (Master Plan, p. 9). The design winter capacity established in the Master Plan for lifts, groomed ski trails, and skier service facilities is 13,900 PAOT (Master Plan, p. 9). Parking would account for approximately 12,500 PAOT and alternative forms of transportation would account for the remaining 1,400 visitors. The amount of parking authorized in the Master Plan was limited as a means to promote alternative transportation modes and to minimize the land area committed to development (Master Plan, p. 9).

Table 3-4: Estimated Existing Acres and Vehicles at MHM Compared to Master Plan.

	Parking Area Size (Acres)	Estimated Number of Vehicles	Estimated Vehicles Per Acre of Parking	Estimated PAOT from Parking Lots
Existing	21.8 acres	2,639 Vehicles	121	6,598 PAOT
Authorized in Master Plan	30.5 acres	4,600 Vehicles	140	12,500 PAOT

MHM operates a Nordic Center within the HRM parking lot. It currently provides equipment rental, ticket sales and Nordic skiing lessons. Parking for the Nordic Center/Trails is currently shared with the HRM parking lot and lift access. The Nordic Center facilities are located at the opposite side of the parking area from and HRM facilities and lift access. As a result, parking is almost always available for the Nordic Center. On peak use days however, parking for both Nordic and downhill skiing can become scarce. In the event the ski resort reaches maximum capacity, visitors for both uses are turned away.

Teacup Sno-park currently provides 1.5 acres of parking. On-going construction activities have resulted in the temporary closure of several other sno-parks along Highway 35 corridor. As a result, Teacup is currently experiencing an increase in use and would continue to see this increased use until the remaining sno-parks are able to open.

FS System Trails

Hiking continues to be one of the most popular recreational activities on the Forest. Within MHM's Permit Area, several hiking trails (or portions of trails) exist, including the Umbrella Falls Trail #667 (3.5 miles), Sahalie Falls Trail # 667C (1.7 miles) and Elk Meadows Trail #645

(9.3 miles). All three trails share a trailhead located along Forest Road 3545. Public parking for trail users is provided within the MHM's Permit Area with no fee imposed by the ski resort. They are all considered class 3 (developed). Typical tread widths are around 24-inches and the typical clearing limits (trees cut on either side of the trails) are around 36-60 inches. Present annual use of these trails is estimated at over 2,500 persons.

Umbrella Falls and Sahalie Falls trails can be hiked together to provide a 5+ mile loop route. The elevation of these trails range from 4,600 feet to 5,770 feet at the highest point. The season of use fluctuates depending on snow pack, but the trails are generally open from late June through mid-October. Some of the trail highlights include beautiful alpine meadows, two waterfalls, and a close up view of Mt. Hood. In mid to late summer there is an abundance of wildflowers.

Elk Meadow South trail provides a critical link to the Mt. Hood Wilderness and the Timberline Trail (#600). The elevation ranges from 4,600 feet to 5,050 feet. The season of use is generally the same as Umbrella Falls and Sahalie Falls (June-October). Trail highlights include beautiful views of Mt. Hood and an abundance of wildflowers.

Dispersed Recreation

During the summer, MHM generally locks all of the gates to the developed parking areas restricting recreational access to foot traffic only. The Permit Area is used daily by those driving for pleasure, viewing the scenery, accessing hiking trails (day use and overnight backpacking), viewing wildlife, picnicking, gathering huckleberries and others forest products. Please see the Heritage Report for this project for more information of the traditional uses of forest products. During the winter season, the area is also used for snowshoeing (off of the groomed Nordic trail system) and provides access for backcountry skiing.

Recreation Opportunity Spectrum (ROS)

The overall Recreation Opportunity Spectrum (ROS) class for the Permit Area is defined as Rural (Master Plan, p. 16). Rural settings are generally characterized by substantially urbanized and modified natural environments. Although sites may appear natural, vegetation is often manicured. Renewable resource modification and utilization practices enhance specific recreation activities (downhill skiing and snowboarding). The sights and sounds of humans on-site are predominant. Large numbers of visitors can be expected, both on-site and in nearby areas. Facilities for parking and mass transit are often available.

3.1.3. Effects Analysis/Environmental Consequences

Alternative 1 (No Action) – Direct and Indirect Effects

Downhill Ski Area Operation

Without increasing the parking capacity, MHM would not be able to facilitate an increase in downhill skiing opportunities within their permit boundary. Operations would continue to function below the design capacity of 13,900 PAOT (persons-at-one-time) established for lifts, groomed ski trails, and skier service facilities. Demand for winter recreation opportunities at MHM would continue to increase; however, use of the resort would be limited by the availability of parking and the capacity of alternative forms of transportation (i.e., increased carpooling, increased busing, and mass transit).

Nordic Ski Operations

As demand continues to increase at MHM, visitors attempting to access the Nordic ski trails may also have difficultly parking. As a result, they may be displaced to the surrounding Nordic Trail Systems or park their vehicles at Teacup Sno-Park or Bennet Pass Sno-Park. Some users may attempt to access the MHM's Nordic Trail system from less desirable locations, such as Highway 35 or FS Road 3545.

Ski Area Parking (Demand - Peak Days)

If no action is taken to address the purpose and need, when parking facilities reach capacity (peak use days) all additional recreational visitors would be directed away from the developed parking areas at MHM. These visitors may continue to attempt to find additional parking in other less desirable and potentially dangerous locations (such as alongside Highway 35 or FS Road 3545). They may also travel to a different location on the Forest to access similar recreational opportunities (other ski resorts) or they may leave the National Forest. The already fully utilized parking at Teacup Lake Nordic Trail system could continue to receive additional pressure from recreational traffic attempting to access facilities at MHM. The additional 8 acres of parking authorized in the Master Plan would not be developed (Master Plan, p. 10).

FS System Trails

There would be no direct or indirect effects to hiking trails in the analysis area because none of the proposed activities (i.e., constructing a parking lot or relocating Nordic trails) would occur.

Dispersed Recreation

There would be no direct or indirect effects to dispersed recreation in the analysis area because none of the proposed activities (i.e., constructing a parking lot or relocating Nordic trails) would occur.

Recreation Opportunity Spectrum (ROS)

There would be no direct or indirect effects to ROS in the analysis area because none of the proposed activities (i.e., constructing a parking lot or relocating Nordic trails) would occur.

Alternative 2 (Proposed Action) – Direct and Indirect Effects

Downhill Ski Area Operation

The increase in parking capacity would alleviate parking congestion and facilitate the use of the resort by a larger number of people. Ski area operations would continue to function below the design capacity of 13,900 PAOT established for lifts, groomed ski trails, and skier service facilities (Master Plan, p. 9). The additional parking would allow MHM the capacity to bring an estimated 8,773 PAOT to the ski resort by means of private vehicles. If 1,400 (47 buses) additional resort patrons arrive at the resort via alternative forms of transportation (e.g., carpooling, busing, or mass transit), this total would still be below the design capacity. The increase in shuttle bus transportation would reduce the distance visitors would need to walk to reach the skier facilities.

The additional parking capacity could result in longer lines to access lifts and additional pressure on skier service facilities. An increase in shuttle bus traffic associated with the Twilight Equipment Maintenance Yard (Bus Shop) would be noticeable traveling to/from the new parking lot adding to the vehicle traffic within the Permit Area. The Sunrise Maintenance Shop would provide MHM the additional capacity to ensure the maintenance needs are met for buses and snow equipment. The proposed left- and right-turn lanes would also alleviate traffic congestion for people traveling to the ski resort.

Downhill skiers/snowboards could potentially use the East Access Nordic Trail to and from the Hood River Meadows Lift. The terrain generally slopes away from the mountain. As users become more familiar with the new parking area location, a greater potential exists for use of the Nordic trail by downhill users on their way back to their vehicles at the end of the day verses users skiing uphill to access the Hood River Meadows Lift at the beginning of the day. The route between the Hood River Meadows Chair Lift and the proposed parking area would be around ¾ of a mile.

Nordic Ski Operations

Opportunities for Nordic skiing at MHM would change. A little over a ½ mile (2,746 feet) of the existing Nordic ski trails would be removed to allow for the Twilight Parking lot. Portions of the Lower Hanel Loop Trail (intermediate) and the Little Loop trail (easiest) would be affected (see Figure 3-2 below). The overall flow of the trail system would change in that skiers would have to remove their skis to cross the access road into the parking area. New Nordic trails would be constructed resulting in no net loss of trail mileage.

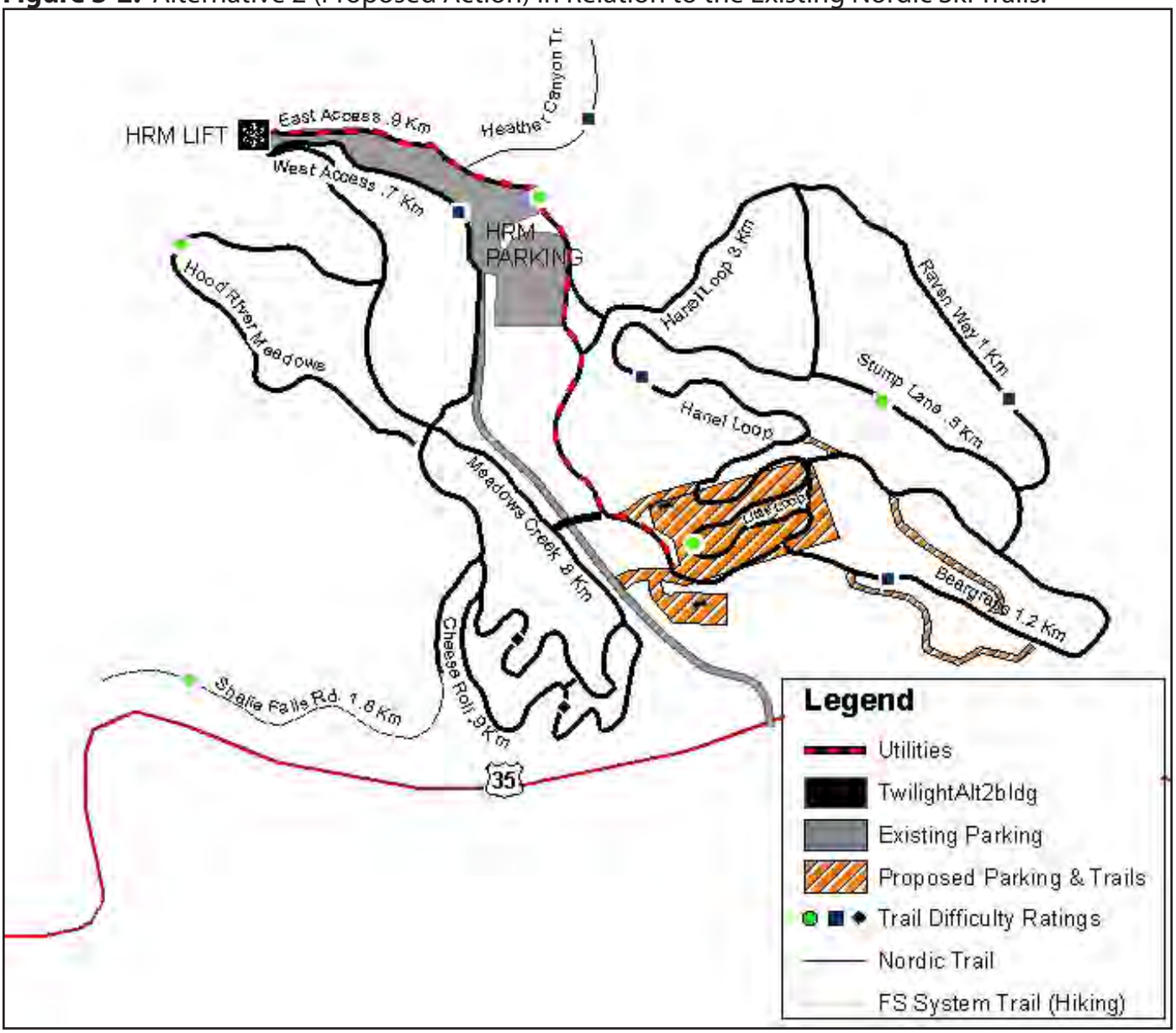
Currently, the experience provided by the Lower Hanel Loop trail is a series of four flowing turns traversing rolling hills (undulating terrain) that require an intermediate level of Nordic skiing ability to negotiate. The new trails proposed would remove the lower curved turns and replace them with more linear (straight) connector trails; thereby changing the skier experience at these locations. The overall difficulty ratings of the new trails (intermediate) would remain the same as they would be constructed on similar terrain. The Little Loop Trail would be completely removed resulting in a loss of a small section of trail on relatively flat terrain suitable for beginning level Nordic skiers.

Table 3-5: Length of Nordic Trails by Difficulty Ratings

Difficulty	Length	% of Trail System	Amount of Change
Easiest	3.8 km (2.3 miles)	20%	5% less (-0.8 km / -0.5 miles)
Intermediate	10.5 km (6.5 miles)	75%	5% more (+11.3 km / +7.0 miles)
Most Difficult	0.8 km (0.5 mile)	5%	No change

The new location of the Nordic Center within the proposed parking area would provide better opportunities to access other beginning level trails. Nordic skiers and resort instructors would have the ability to ski from the Nordic Center to the Hood River Meadows Trail (easiest) and the Sahalie Falls Road (easiest) using all terrain suitable for new skiers. The new location of the Nordic Center would also provide additional parking for Nordic events. During weekdays and other times of off-peak use the new Twilight Parking lot would primarily be used by Nordic skiers.

Figure 3-2: Alternative 2 (Proposed Action) in Relation to the Existing Nordic Ski Trails.



Ski Area Parking (Demand - Peak Days)

Overall parking capacity would be increased by an estimated 33 percent. The 8 acres of additional parking authorized in the Master Plan would be exceeded by 1.4 acres. The total acres outlined for base expansion in the Master Plan would be exceeded by 3.1 acres (Master Plan, p. 8). However, the estimated vehicle capacity and PAOT would remain below what has been authorized in the Master Plan. The Forest would be able provide winter recreation for a greater number of people. Parking capacity would be sufficient to accommodate current use levels during peak use times. At current use levels, safety issues associated with parking in undesirable and potentially dangerous locations would be addressed.

If visitation to MHM continues to increase as it has over the past ten year (approximately 3.4 percent per year), than the Forest Service may begin to see peak-use days reach maximum capacity of the proposed parking area in an estimated 10 to 15 years (see Figure 3-1). At that time, the amount of parking authorized combined with the availability of alternative transportation

would become the limiting factors on overall use. Please see the recreation project design criteria (R-1 thru R4) for steps being taken to reduce the potential safety issues associated with unauthorized parking.

Table 3-6: (Alternative 2.) Estimated Parking/Capacities vs. Master Plan.

	Paved Area used for Parking Vehicles (Acres)	Base Area Size (Acres)*	Estimated Number of Vehicles**	Estimated PAOT from Parking Lots
Existing	21.8 acres	35.7 acres	2,638 Vehicles	6,595 PAOT
Alternative 2 Proposed Action	7.2 acres	9.4 acres	871 Vehicles	2,178 PAOT
Total	**29 acres**	**45.1 acres**	**3,510 Vehicles**	**8,773 PAOT**
Authorized in Master Plan	Not Defined	42 acres	4,600 Vehicles	12,500 PAOT
Compared to Master Plan		3.1 acres more then authorized	1091 vehicles less then authorized	3,727 PAOT less authorized

* Area includes parking, stormwater management, and snow storage.
**Estimated at 121 vehicles per acre.

FS System Trails

In the short term, sights and sounds associated with the installation of the utility lines (power, water, sewer, and telephone) would be apparent from the Elk Meadows Trailhead. The trails traveling northeast from the Elk Meadows Trailhead (e.g., Sahalie Falls and Elk Meadows trail) would be closed to recreation traffic while the utility lines are being installed across the trail tread. Through hikers on the Timberline Trail would be unable to begin or end their hike at this trailhead during those times. Day hikers would be displaced to other trails.

Dispersed Recreation

Opportunities for dispersed recreation would change for approximately 14.3 acres of forested lands within the MHM permit area. The previously forested areas would be cleared of vegetation and developed/paved for parking, maintenance yards, guest services buildings, access roads, snow storage, and storm water runoff. Visitors viewing wildlife, picnicking, gathering huckleberries and others forest products would be displaced to the surrounding forested areas.

During times of construction, implementation activities associated with the installation of the utility lines (power, water, sewer, and telephone) and the removal of trees for the construction of the proposed Twilight Parking lot (and associated facilities) would displace dispersed recreational uses of the area. Sights and sounds of chainsaws felling trees would be evident. Skidders, bulldozers, excavators, frontend loaders, stump grinders, dump trucks, log trucks, graders, compactors, asphalt pavers, fork lifts, and concrete trucks would all be used in various stages of project implementation. The increase in traffic within the project area would be evident.

Recreation Opportunity Spectrum (ROS)

The increase in development would be in conformance with the Rural ROS designation. Sights and sounds of humans on-site would be increased in the area during the winter months and resort operations would predominant.

Alternative 3 – Direct and Indirect Effects

Downhill Ski Area Operation

The increase in parking capacity would alleviate parking congestion and facilitate the use of the resort by a larger number of people. The additional parking would allow MHM the capacity to bring an estimated 8,863 PAOT at the ski resorts by means of private vehicles. Further effects on the Downhill Ski Area Operation would be the same as described under Alternative 2.

Nordic Ski Operations

Approximately, 0.7 miles (3,432 feet) of Nordic ski trails would be removed to allow for the additional parking. Portions of the Lower Hanel Loop Trail (Intermediate) and the Little Loop trail (easiest), and the Beargrass Loop (easiest) would be affected. New Nordic trails would be constructed resulting in no net loss of trail mileage.

The new trails proposed would replace the turns provided by the Hanel Loop and Little Loop Trails with very similar flowing turns. While the location of trails would be moved from their current location, the Nordic skier experience of traversing over undulating terrain would remain the same. Section of the Beargrass Loop trail would be replaced by trails that would skirt the outside of the parking area. Small sections of these trails would not be buffered from the parking area by trees. A potential exists for road gravel from Highway 35 winter road maintenance to be blown from the parking area onto these trails. The lack of vegetation between the parking area and the trail may also result in a minimal amount of gravel (used for winter road maintenance) being blown onto the trail. Please see the Recreation Project Design Criteria (R-7) for measures taken to reduce this effect. Overall, the flow of the trail system would change as the location of the Nordic Center would change. Skiers would also have to remove their skies to cross the access road into the parking area.

The Little Loop Trail would be completely removed resulting in a loss of a small section of trail on relatively flat terrain suitable for beginning level Nordic skiers. The new location of the Nordic Center within the proposed parking area, however, would provide better opportunities to access other beginning level trails. Nordic skiers and Resort Instructor would have the ability to ski from the Nordic Center to the Hood River Meadows Trail (easiest) and the Shalie Falls Road (easiest) using all terrain suitable for new skiers. The new location of the Nordic Center would also provide additional parking of Nordic events. During weekdays and other times of off-peak use the new Twilight Parking lot would primarily be used by Nordic skiers.

Table 3-7: Length of Nordic Trails by Difficulty Ratings

Difficulty	Length	% of Trail System	Amount of Change
Easiest	2.8 km (1.8 miles)	19%	6 % less (-0.9 km / -0.6 miles)
Intermediate	11.4 km (7.0 miles)	76%	6% more (+0.9 km / + 0.6 miles)
Most Difficult	0.8 (0.5 mile)	5%	No change

Ski Area Parking (Demand - Peak Days)

Overall parking capacity would be increased by an estimated 34 percent. The 8 acres of additional parking authorized in the Master Plan would be exceeded by 5.8 acres. The total acres outlined for base expansion in the Master Plan would be exceeded by 7.5 acres (Master Plan, p. 8). The estimated vehicle capacity and PAOT would remain below what has been authorized in the Master Plan. Effects on ski area parking would be the same as described under Alternative 2.

Table 3-8: Estimated Parking/Capacities in Alternative 3 compared to The Master Plan.

	Paved Area used for Parking Vehicles (Acres)	Base Area Size (Acres)*	Estimated Number of Vehicles**	Estimated PAOT from Parking Lots
Existing	21.8 acres	35.7 acres	2,638 Vehicles	6,595 PAOT
Alternative 3	7.5 acres	13.8 acres	908 Vehicles	2,269 PAOT
Total	**29 acres**	**49.5 acres**	**3,545 Vehicles**	**8,863 PAOT**
Authorized in Master Plan	Not Defined	42 acres	4,600 Vehicles	12,500 PAOT
Compared to Master Plan		7.5 acres more then authorized	1,055 vehicles less then authorized	3,637 PAOT less authorized

* Parking Areas in the Master Plan includes parking, stormwater management, and snow storage.
**Estimated at 121 vehicles per acre.

FS System Trails

Effects on the FS System Trails would be the same as described under Alternative 2.

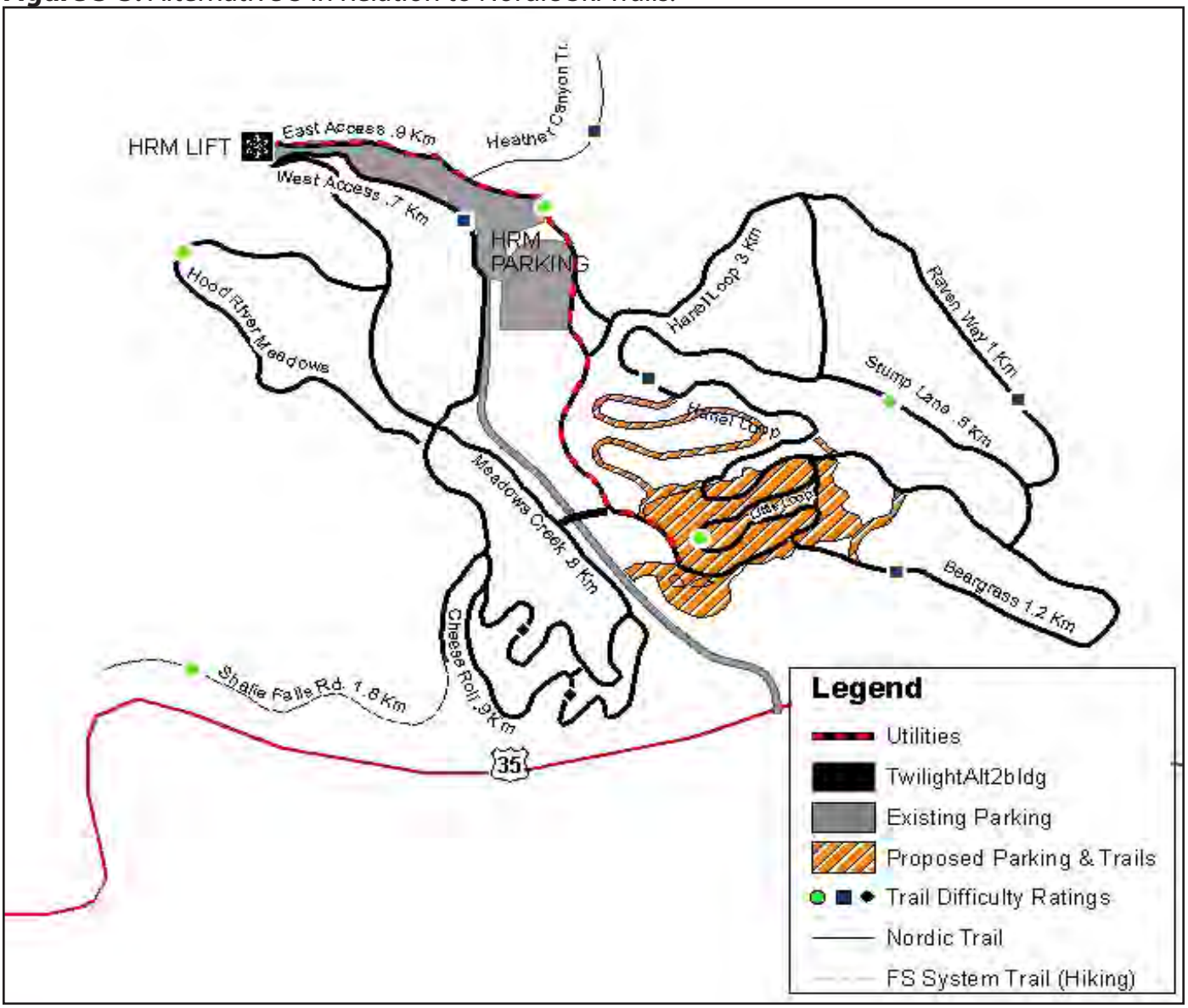
Dispersed Recreation

Opportunities for dispersed recreation would change for approximately 20.3 acres of forested lands within the MHM permit area. The previously forested areas would be cleared of vegetation and developed/paved for parking, maintenance yards, guest services buildings, access roads, snow storage, and storm water runoff. Visitors viewing wildlife, picnicking, gathering huckleberries and others forest products would be displaced to the surrounding forested areas. All other effects would be the same as described under Alternative 2.

Recreation Opportunity Spectrum (ROS)

Effects on the current ROS designation would be the same as described under Alternative 2.

Figure 3-3: Alternative 3 in Relation to Nordic Ski Trails.



Alternative 4 – Direct and Indirect Effects

Downhill Ski Area Operation

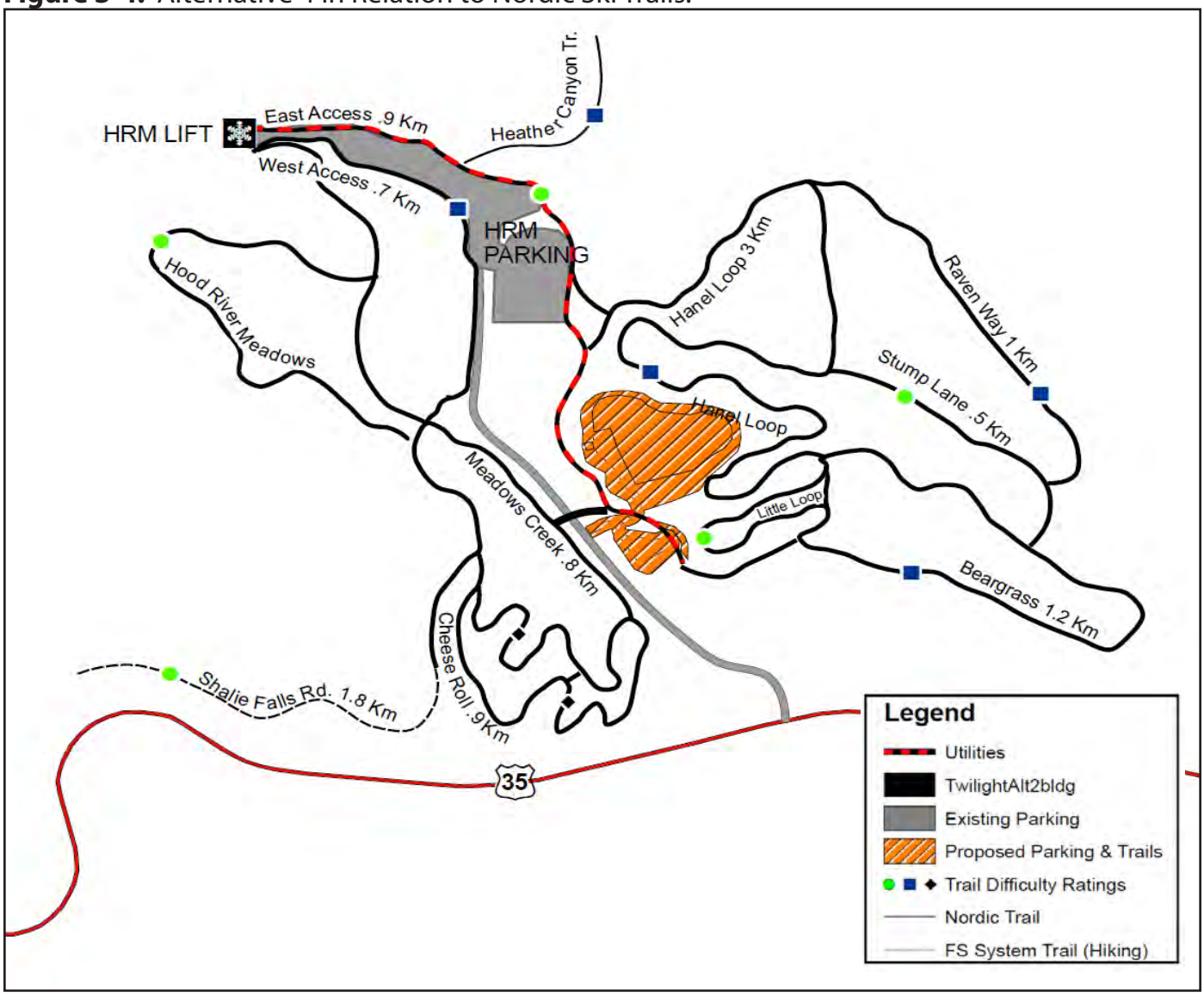
The increase in parking capacity would alleviate parking congestion and facilitate the use of the resort by a larger number of people. The additional parking would allow MHM the capacity to bring an estimated 8,077 PAOT at the ski resorts by means of private vehicles. Further effects on the Downhill Ski Area Operation would be the same as described under Alternative 2.

Nordic Ski Operations

Very little of the existing Nordic ski trails would be effected. Approximately, 280 feet of trail would be relocated to avoid the Twilight Equipment Maintenance Yard (Bus Shop). Therefore, there would be no measurable effect on the change in the Nordic skiing experience in this Alternative. The overall flow of the trail system would change as the location of the Nordic Center would change. Skiers would begin by skiing around the outside of the parking to access the East

Access trail or the Lower Hanel Loop. Skiers would also have to remove their skies to cross the access road into the parking area as they currently do to access the Meadows Creek Trail. No change would occur to the difficulty rating of the Nordic trails.

Figure 3-4: Alternative 4 in Relation to Nordic Ski Trails.



Ski Area Parking (Demand - Peak Days)

Overall parking capacity would be increased by an estimated 23 percent. The 8 acres of additional parking would be developed as authorized in the Master Plan. The total acres outlined for base expansion in the Master Plan would be exceeded by 1.7 acres (Master Plan, p. 8). The estimated vehicle capacity and PAOT would remain below what has been authorized in the master plan. The route between the Hood River Meadows Chair Lift and the proposed parking area would be about 1/2 of a mile. Effects on ski area parking would be the same as described under Alternative 2.

Table 3-9: Estimated Parking/Capacities in Alternative 4 compared to the Master Plan.

	Paved Area used for Parking Vehicles (Acres)	Base Area Size (Acres)*	Estimated Number of Vehicles**	Estimated PAOT from Parking Lots
Existing	21.8 acres	35.7 acres	2,638 Vehicles	6,595 PAOT
Alternative 4 Elk Meadow Master Plan	4.9 acres	8 acres	593 Vehicles	1,482 PAOT
Total	**26.7 acres**	**43.7 acres**	**3,231 Vehicles**	**8,077 PAOT**
Authorized in Master Plan	Not Defined	42 acres	4,600 Vehicles	12,500 PAOT
Compared to Master Plan		1.7 acres more then authorized	1,369 vehicles less then authorized	4,423 PAOT less authorized

* Area includes parking, stormwater management, and snow storage.
**Estimated at 121 vehicles per acre.

FS System Trails

In the short term, sights and sounds associated with the installation of the utility lines (power, water, sewer, and telephone) would be apparent from the Elk Meadows Trailhead. The northeast portion of Sahalie Falls Trail (#667c) and Elk Meadows Trail (#645) would be closed to recreation traffic while the utility lines are being installed across the trail tread. Through hikers on the timberline trail would be unable to begin or end their hike at this trailhead during those times. Day hikers would be displaced to other trails (e.g., the western portion of the Sahalie Falls Trail).

Tree removal required to construct the Twilight Parking Lot would close a portion of the Sahalie Falls Trail and Elk Meadows Trail to recreational use while work is occurring. The proposed parking area would remove approximately 700 feet of existing Sahalie Falls Trail (#667c). New trail would be constructed to reroute the trail around the parking area and allow for a corridor of vegetation between the hiking trail and the parking lot. This screening would reduce visual and noise impacts to trail users. Please refer to the Visual Resource Specialist Report available in the project record located at the Hood River Ranger District in Mount Hood/Parkdale, Oregon.

Dispersed Recreation

Opportunities for dispersed recreation would change for approximately 14 acres of forested lands within the MHM permit area. The previously forested areas would be cleared of vegetation and developed/paved for parking, maintenance yards, guest services buildings, access roads, snow storage, and storm water runoff. Visitors viewing wildlife, picnicking, gathering huckleberries and others forest products would be displaced to the surrounding forested areas. All other effects would be the same as described under Alternative 2.

Recreation Opportunity Spectrum (ROS)

Effects on the current ROS designation would be the same as described under Alternative 2.

Figure 3-5: Alternative 4 Elk Meadows Trail Reroute.

Alternative 5 – Direct and Indirect Effects

Downhill Ski Area Operation

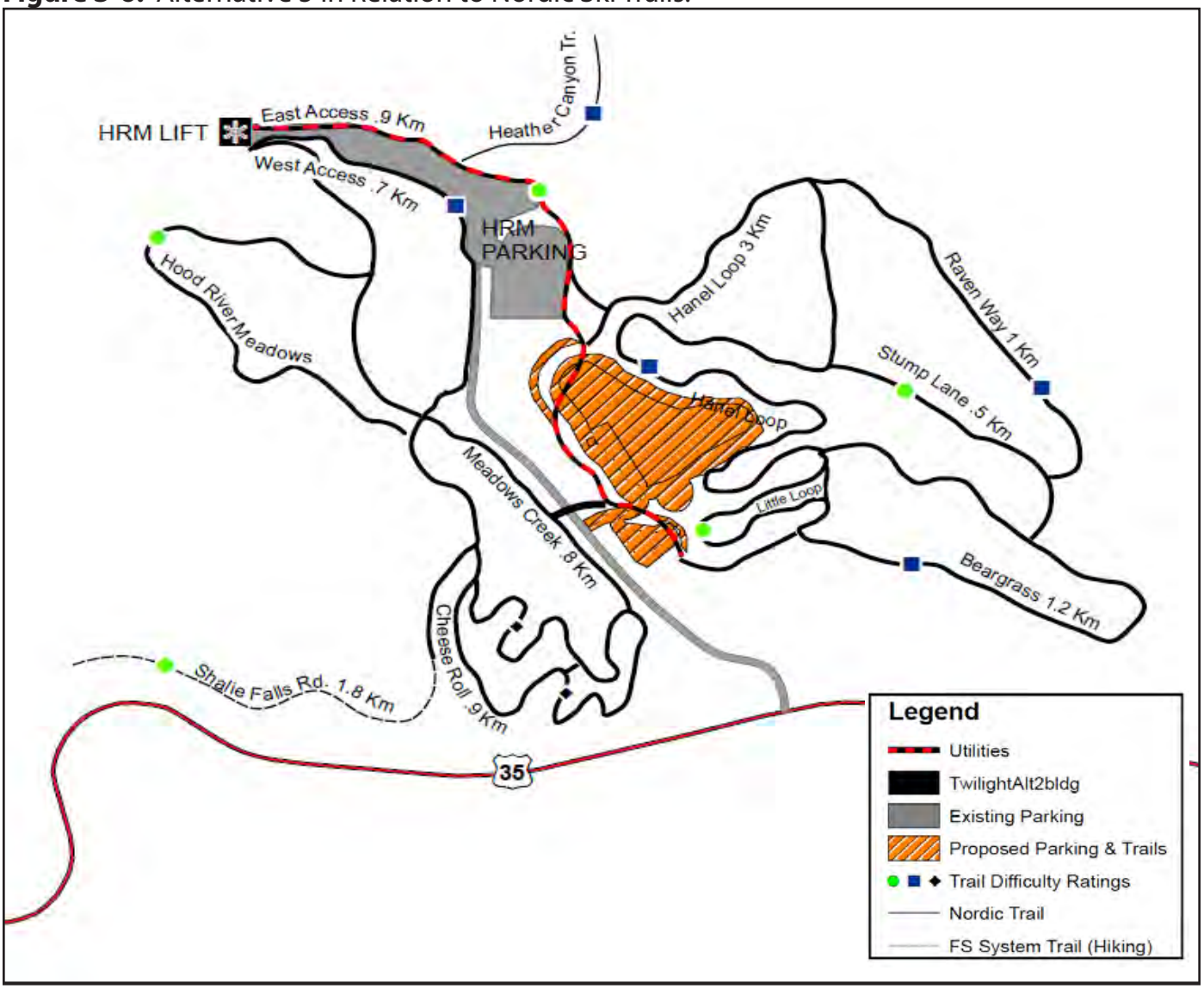
The increase in parking capacity would alleviate parking congestion and facilitate the use of the resort by a larger number of people. The additional parking would allow MHM the capacity to bring an estimated 8,652 PAOT at the ski resorts by means of private vehicles. The route between the Hood River Meadows Chair Lift and the proposed parking area would be area 0.7 of a mile. Further effects on the Downhill Ski Area Operation would be the same as described under Alternative 2.

Nordic Ski Operations

Approximately 870 feet of the East Access Trail would be relocated to avoid the proposed Twilight Parking lot and bus shop. These sections of trail would be very similar to what currently exists and have no measurable effect on the Nordic skiing experience. The overall flow of the trail system would change as the location of the Nordic Center would change. Currently the trails system generally slopes away from the existing Nordic Center within the HRM parking lot. The more centralized location of the parking lot proposed in alternative 5 would provide multiple access points to the trails system both uphill and down. Skiers would also have to remove their skies to cross the access road into the parking area as they currently do to access the Meadows Creek Trail.

Portions of the lower Hanel Loop would be located directly adjacent to the new park area leaving very little screening between the parking area and the trail system. This could result in this section of trail becoming one of the major access points for visitors leaving their vehicles to begin a day of skiing. The lack of vegetation between the parking area and the trail may also result in a minimal amount of gravel (used for winter road maintenance) being blown onto the trail. Please see the Recreation Project Design Criteria (R-7) for measures taken to reduce this effect.

Figure 3-6: Alternative 5 in Relation to Nordic Ski Trails.



Ski Area Parking (Demand - Peak Days)

Overall parking capacity would be increased by an estimated 31 percent. The total acres outlined for base expansion in the Master Plan would be exceeded by 5 acres (Master Plan, p. 8). The estimated vehicle capacity and PAOT would remain below what has been authorized in the master plan. Effects on ski area parking would be that same as described under Alternative 2.

Table 3-10: Estimated Parking/Capacities for Alternative compared to the Master Plan.

	Paved Area used for Parking Vehicles (Acres)	Base Area Size (Acres)*	Estimated Number of Vehicles**	Estimated PAOT from Parking Lots
Existing	21.8 acres	35.7 acres	2,638 Vehicles	6,595 PAOT
Alternative 5	6.8 acres	11.3 acres	823 Vehicles	2,057 PAOT
Total	**28.6 acres**	**47 acres**	**3,461 Vehicles**	**8,652 PAOT**
Authorized in Master Plan	Not Defined	42 acres	4,600 Vehicles	12,500 PAOT
Compared to Master Plan		5 acres more than authorized	1,139 vehicles less then authorized	3,849 PAOT less authorized

* Area includes parking, stormwater management, and snow storage.
**Estimated at 121 vehicles per acre.

FS System Trails

Approximately, 1,500 feet of new trail tread would need to be constructed to reroute the Sahalie Falls Trail (#667c) around the proposed Twilight Parking lot. The trail would be routed through the same clearing proposed to construct the replacement Nordic trail. The trail would then continue along existing Nordic trails until it reconnected with the existing single track tread. Additional tread work and drainage features would need to be constructed to develop a single track type trail within the clearing limits for the Nordic trail. Additional FS standard signs would be needed to direct users through the multiple intersections of Nordic trails.

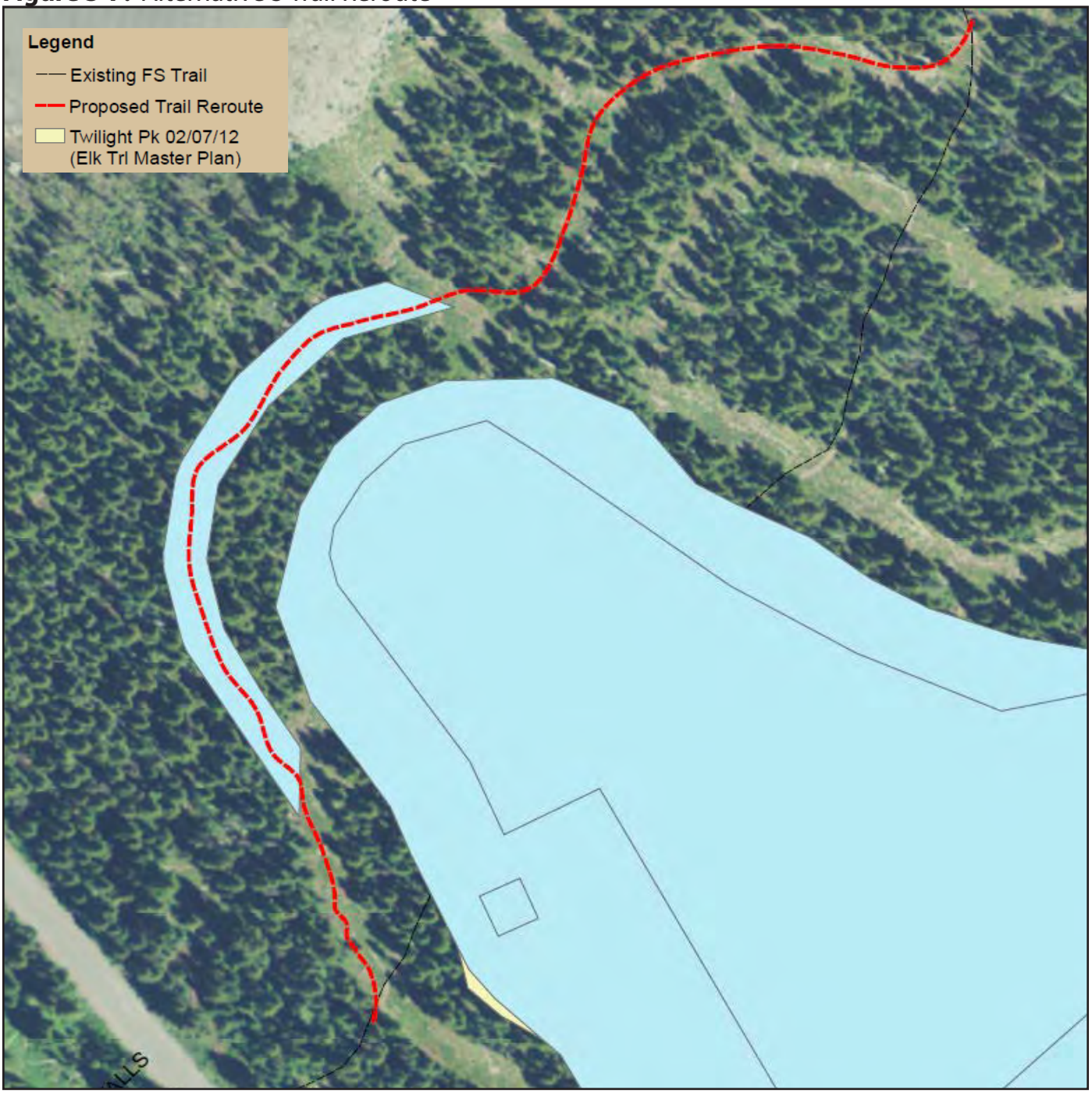
The proposed trail would be closed to recreational use while trees are being removed to construct the Nordic trail. Likewise, the existing trail would need to be closed while trees are being removed for parking area construction. The proposed utility lines (power, water, sewer, and telephone) would also be installed across and in places parallel to the proposed reroute. The end result would be the closure of the trails for at least two seasons of use during periods of construction.

Displaced user could access Umbrella Falls, Elk Meadows, and the Timberline Trail through the HRM Parking lot by following the Heather Canyon Trail. The Sahalie Falls Trail traveling northwest would remain available from the existing Elk Meadow parking area. During times of construction, sights and sounds associated with the installation of the utility lines (power, water, sewer, and telephone) and the removal of trees would be apparent to trail users.

Dispersed Recreation

Opportunities for dispersed recreation would change for approximately 16.4 acres of forested lands within the MHM permit area. The previously forested areas would be cleared of vegetation and developed/paved for parking, maintenance yards, guest services buildings, access roads, snow storage, and storm water runoff. Visitors viewing wildlife, picnicking, gathering huckleberries and others forest products would be displaced to the surrounding forested areas. All other effects would be the same as described under Alternative 2.

Figure 3-7: Alternative 5 Trail Reroute



Recreation Opportunity Spectrum (ROS)

Effects on the current ROS designation would be the same as described under Alternative 2.

<u>Alternative 6 – Direct and Indirect Effects</u>

Downhill Ski Area Operation

The increase in parking capacity would alleviate parking congestion and facilitate the use of the resort by a larger number of people. The additional parking would allow MHM the capacity to bring an estimated 8,652 PAOT at the ski resorts by means of private vehicles. The route

between the Hood River Meadows Chair Lift and the proposed parking area would be area 0.7 miles. Further effects on the downhill ski area operation would be the same as described under Alternative 2.

Nordic Ski Operations

Approximately, 0.7 miles (3,432 feet) of Nordic ski trails would be removed to allow for the additional parking. Portions of the Lower Hanel Loop Trail (intermediate) and the Little Loop trail (easiest), and the Beargrass Loop (easiest) would be affected. New Nordic trails would be constructed resulting in no net loss of trail mileage. Further effects on the Nordic ski operation would be the same as described under Alternative 3.

Figure 3-8: Alternative 6 in Relation to Nordic Ski Trails.

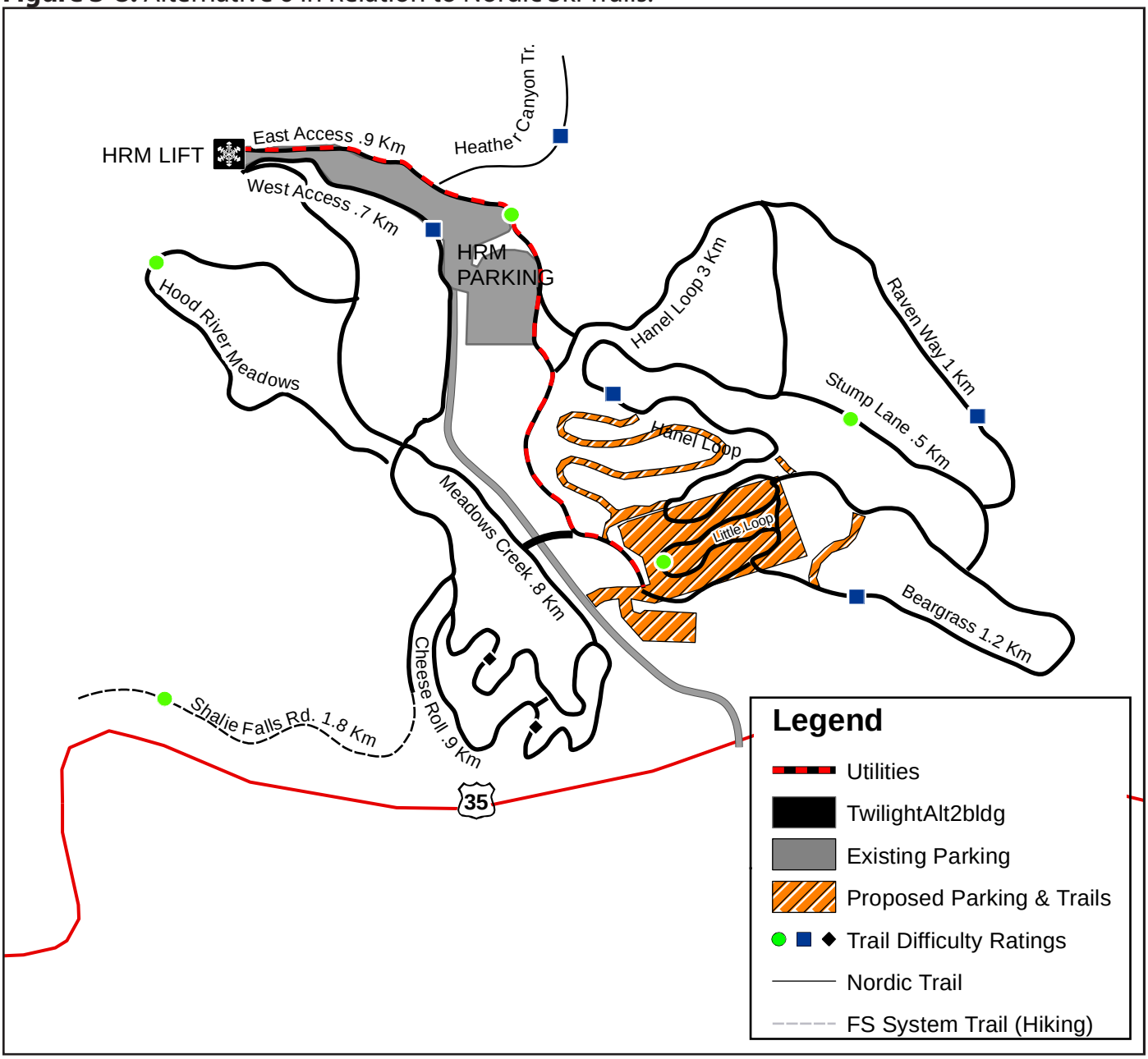


Table 3-11: Length of Nordic Trails by Difficulty Ratings

Difficulty	Length	% of Trail System	Amount of Change
Easiest	2.8 km (1.8 miles)	19%	6 % less (-0.9 km / -0.6 miles)
Intermediate	11.4 km (7.0 miles)	76%	6% more (+0.9 km / + 0.6 miles)
Most Difficult	0.8 (0.5 mile)	5%	No change

Ski Area Parking (Demand - Peak Days)

Overall parking capacity would be increased by an estimated 33 percent. The total acres outlined for base expansion in the Master Plan would be exceeded by 5 acres (Master Plan, p. 8). The estimated vehicle capacity and PAOT would remain below what has been authorized in the master plan. Effects on ski area parking would be that same as described under Alternative 2.

Table 3-12: Estimated Parking/Capacities for Alternative compared to the Master Plan.

	Paved Area used for Parking Vehicles (Acres)	Base Area Size (Acres)*	Estimated Number of Vehicles**	Estimated PAOT from Parking Lots
Existing	21.8 acres	35.7 acres	2,638 Vehicles	6,595 PAOT
Alternative 6	7.2 acres	11.3 acres	871 Vehicles	2,177 PAOT
Total	**29.0 acres**	**47.0 acres**	**3,509 Vehicles**	**8,773 PAOT**
Authorized in Master Plan	Not Defined	42 acres	4,600 Vehicles	12,500 PAOT
Compared to Master Plan		5 acres more than authorized	1,091 vehicles less then authorized	3,727 PAOT less authorized

* Area includes parking, stormwater management, and snow storage.
**Estimated at 121 vehicles per acre.

FS System Trails

Effects on the FS System Trails would be the same as described under Alternative 2.

Dispersed Recreation

Opportunities for dispersed recreation would change for approximately 19 acres of forested lands within the MHM permit area. The previously forested areas would be cleared of vegetation and developed/paved for parking, maintenance yards, guest services buildings, access roads, snow storage, and storm water runoff. Visitors viewing wildlife, picnicking, gathering huckleberries and others forest products would be displaced to the surrounding forested areas. All other effects would be the same as described under Alternative 2.

Cumulative Effects for All Alternatives

The cumulative effects for this project would be the same for all alternatives. The spatial area considered for recreation resources is the Permit Area and surrounding Sno-parks/Nordic ski trails. The rationale for this boundary is the interconnected access to winter recreational

resources. The temporal boundary considered for recreation resources is dependent on the existing or future project/activities if there is an overlap in time from an effects perspective then it is included in this analysis. Cumulative effects are outlined in the table below.

Table 3-13: Cumulative Effects for Recreation

Project Considered for Cumulative Effects	Potential Effects	Overlap in		Measurable Cumulative Effect Described Below?
		Time	Space	
Highway 35 betterment projects	Nordic Ski Operations	Yes	Yes	Yes
Meadows Creek Highway 35 and Teacup Roads culverts replacement	Nordic Ski Operations	Yes	Yes	Yes
Teacup grooming activities	None	Yes	Yes	No
Bluegrass Ridge and Dollar Lake Complex Fires	FS System Trails	No	No	No
Stadium Lift realignment	Downhill Ski Area Operations	Yes	Yes	Yes
Buttercup Lift improvements	Downhill Ski Area Operations	Yes	Yes	Yes
Annex Wetland restoration at Sunrise	Downhill Ski Area Operations	No	Yes	No
General on-going road maintenance including winter road treatments	None	Yes	Yes	No
General on-going ski area activities	Downhill Ski Area and Nordic Ski Operations	Yes	Yes	Yes
Sahalie Falls bridge stabilization	Nordic Ski Operations FS System Trails	Yes	Yes	Yes
Pre-commercial thinning	None	No	No	No
Avalanche control	None	Yes	Yes	No

Downhill Ski Area Operations

In the reasonably foreseeable future, general on-going ski area activities combined with an increase in parking capacity at MHM could potentially increase overcrowding at the resort and result in increased lift lines and demand on visitor facilities. Peak use days generally correspond with major snow events. Occasionally, large winter snowstorms increase potential avalanche dangers within the resort boundary to the point that MHM cannot open all of the existing lifts. During these times the additional patrons able to access the resort (due to an increase in parking capacity) would be restricted to lifts open for operation. The overlap of these two events could have an affect on downhill ski area operations. The Stadium Lift realignment and the Buttercup Lift improvements would help to alleviate some of the congestion by improving lift services at the resort.

Nordic Ski Operations

Construction activities associated with the Highway 35 betterment projects have resulted in an increase of parking capacity at Teacup Lake Nordic Area and the closure of the Clark Creek Sno*park. These changes have resulted in no net gain or loss of parking that these two site. The

closure of Clark Creek did however limit Nordic Skiing opportunities on the east side of Hwy 35. The increase in parking at MHM would help to facilitate these activities.

On-going ski area activities combined with additional parking for Nordic events at MHM would also be an incremental benefit for Nordic users and the events that they'd have on peak demand days. Meadows Creek Highway 35 and Teacup Roads culverts would have no know cumulative effects as the installation work would not correspond with Nordic skiing opportunities.

Sahalie Falls bridge stabilization could result in the temporary closure of portions of the Sahalie Falls road to Nordic skiing. This combined with the actions proposed in this project would result in a slight increase of ski trails considered in the easiest category for the duration of the bridge stabilization project.

Ski Area Parking (Demand - Peak Days)
No cumulative effects would occur because no known additional parking improvement would be implemented other then those described in this document. The Annex Wetland restoration at Sunrise did not occur within the temporal boundaries of this analysis.

FS System Trails
Bluegrass Ridge and Dollar Lake Complex Fires could have potential impacts on recreational access into the Mt. Hood Wilderness; however, the fires did not occur within the area analyzed and therefore are excluded from this analysis

Dispersed Recreation
No cumulative effects would occur to dispersed recreation as no other project would require the clearing of vegetation reducing opportunities for dispersed recreation.

Recreation Opportunities Spectrum (ROS)
There would be no cumulative effects to ROS in the analysis area because all proposed projects would fall within the category of a Rural ROS designation.

3.1.4 Consistency Determination

All of the action alternatives proposed would meet the goals and objectives of the Mt. Hood National Forest Land and Resource Management Plan (Forest Plan) as defined by A-11 Winter Recreation Areas Management Area Direction.

All alternatives would implement the Mt. Hood Meadows Ski Area Master Plan Record of Decision providing additional parking at the Hood River Meadows Base Area (Master Plan, p. 11). All the alternatives would expand the base areas (acres) beyond what was authorized (Master Plan, p. 8). The base expansion is due the incremental increases done through a wide variety of projects in the years since the Master Plan became effective. Alternatives 2, 3 and 5 implement a parking lot greater than authorized by the Master Plan, while Alternative 4 implements a parking lot that does not exceed the description in the Master Plan. See the Management Direction section of Chapter 1 for a complete description of the consistency with the Master Plan. This project would be consistent with the Recreation PDC found in the Master Plan.

Design standards for Forest Service Trails are found in Forest Service Handbook 2309.18 and vary depending on designed use and trail class. Each of the action alternatives would continue to provide a broad range of developed and dispersed recreation opportunities in balance with

existing and future demand. No ROS class would be compromised in any alternative. No special area designation (e.g., Wilderness, Wild and Scenic River, Roadless) would be affected as none of these designations occur within the project area.

3.1.5 Summary of Effects by Alternative

Downhill Ski Area Operations

Under Alternatives 2 through 6 MHM would increase the parking capacity within the Permit Area; thereby alleviating parking congestion and facilitating the use of the resort by a larger number of people. The additional visitor capacity would also result in longer lift lines and additional pressure on skier service facilities. None of the alternatives would result in visitation levels that exceed the winter designed capacity established in the Master Plan for lifts, groomed ski trails, and skier service facilities (Master Plan, p. 9).

Nordic Ski Operations

Alternatives 2 and 3 would have the greatest effects on the existing Nordic trail system (including difficulty ratings). Alternative 2 replaces the curved undulating trails with much more straight/uniform trails. Alternatives 3 and 6 replace the loss of the trails with similar curved turns on undulating terrain. Alternatives 4 and 5, however, would only slightly modify the existing trails; thus, any changes to the skier experience and difficulty ratings would be negligible.

Ski Area Parking (Demand - Peak Days)

Alternative 4 would develop the 8 acres of additional parking as outlined in the Master Plan. Alternatives 2, 3, 5 and 6 would all exceed the 8 acres authorized. All action alternatives would address safety issues associated with visitors parking in undesirable and potentially dangerous locations. If the estimated increase in visitation continues however, these issues could arise again in the future once the maximum capacity for the new parking lot is reached. The amount of parking authorized combined with the availability of alternative transportation would continue to be a limiting factor on overall use for all alternatives. The vehicle parking capacity within MHM would remain below what is authorized in the Master Plan under all alternatives.

FS System Trails

Alternatives 4 and 5 would have the greatest effects on the existing hiking trails within the Permit Area. They would both require minor reroutes on Sahalie Falls Trail (#667C). All action alternatives would require the Sahalie Falls Trail (#667c) and Elk Meadows Trail (#645) to be temporarily closed while the utility lines are being installed to the proposed parking areas.

Dispersed Recreation

All action alternatives would result in a corresponding loss of forested land available for dispersed recreational use. The previously forested areas would be cleared of vegetation and developed/paved for parking, maintenance yards, guest services buildings, access roads, snow storage, and storm water runoff.

Table 3-14: Estimated Acres of Forested Lands Effected

Action	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Twilight Parking	9.4 Acres	13.8 Acres	8.0 Acres	11.3 Acres	9.4 Acres
Twilight Maintenance Yard	3.1 Acres	3.1 Acres	2.6 Acres	2.6 Acres	3.1 Acres
Sunrise Maintenance Shop	1.75 Acres	3.4 Acres	3.4 Acres	2.5 Acres	2.5 Acres
Total	14.3 Acres	20.3 Acres	14.0 Acres	16.4 Acres	15 Acres

Recreation Opportunity Spectrum (ROS)
No ROS class would be compromised in any of the alternatives.

3.1.6 Incomplete and Unavailable Information

It is unknown how much longer lift lines times would be with the additional proposed parking capacity. Lift line times would vary depending on the overall dispersal of people on the resort and would change day to day. Several other factors could contribute to this including weather conditions, skill level of users, and utilization of all available ski lifts. The relevance of this information pertains to the potential to create a sense of "overcrowding" at the resort in the reasonably foreseeable future. It is known that the uphill lift capacity at MHM is 16,145 people per hour when all lift are running. The Master Plan authorized 13,900 (13,100 alpine and 800 Nordic) PAOT. The impacts in this report were described as an "increase in lift lines" verses a quantified wait time.

It is unknown why the original estimates for vehicle capacity and the actual total amount of vehicles parked in the existing lots differ. This could be due to an increase in overall vehicle size in the past 15 years since the Master Plan was written. The Master Plan estimated that 140 vehicles could be parked per acre at MHM. The actual use numbers are less. The relevance of this information applies directly the determination of parking capacity in the reasonably foreseeable future. It is known that 2,631 vehicles parked at one time during the peak of the 2011 ski season. This information was used to evaluate the impacts in this report.

3.2. Transportation

More information is available in the project record including the full transportation analysis file as part of the Transportation Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.2.1 Analysis Assumptions and Methodology

This analysis determines the traffic impacts associated with the proposed Twilight Parking Lot and was prepared in accordance with the Oregon Department of Transportation's (ODOT) requirements for a traffic impact study. Requirements for a traffic impact study include existing

area conditions related to traffic volumes and conditions, transit availability, high accident locations, and known operational problems. Additionally, traffic forecasts must include non-site traffic and site-generated traffic for the traffic analysis.

Due to the geographic extents of the US 26/OR 35 corridor, the study area has been divided into four sections for analysis purposes.

a. The *Government Camp section* includes the segment of US 26 from the Ski Bowl West Driveway through the Timberline Highway. Within this section, US 26 has a three-lane cross-section with two eastbound travel lanes and one westbound travel lane. All intersecting roadways within this section are two-way roadways that operate with stop control.

b. The *US 26/OR 35 Interchange section* consists of the US 26/OR 35 interchange, which is a free-flow interchange with four lanes on each of the westbound, eastbound and northbound legs.

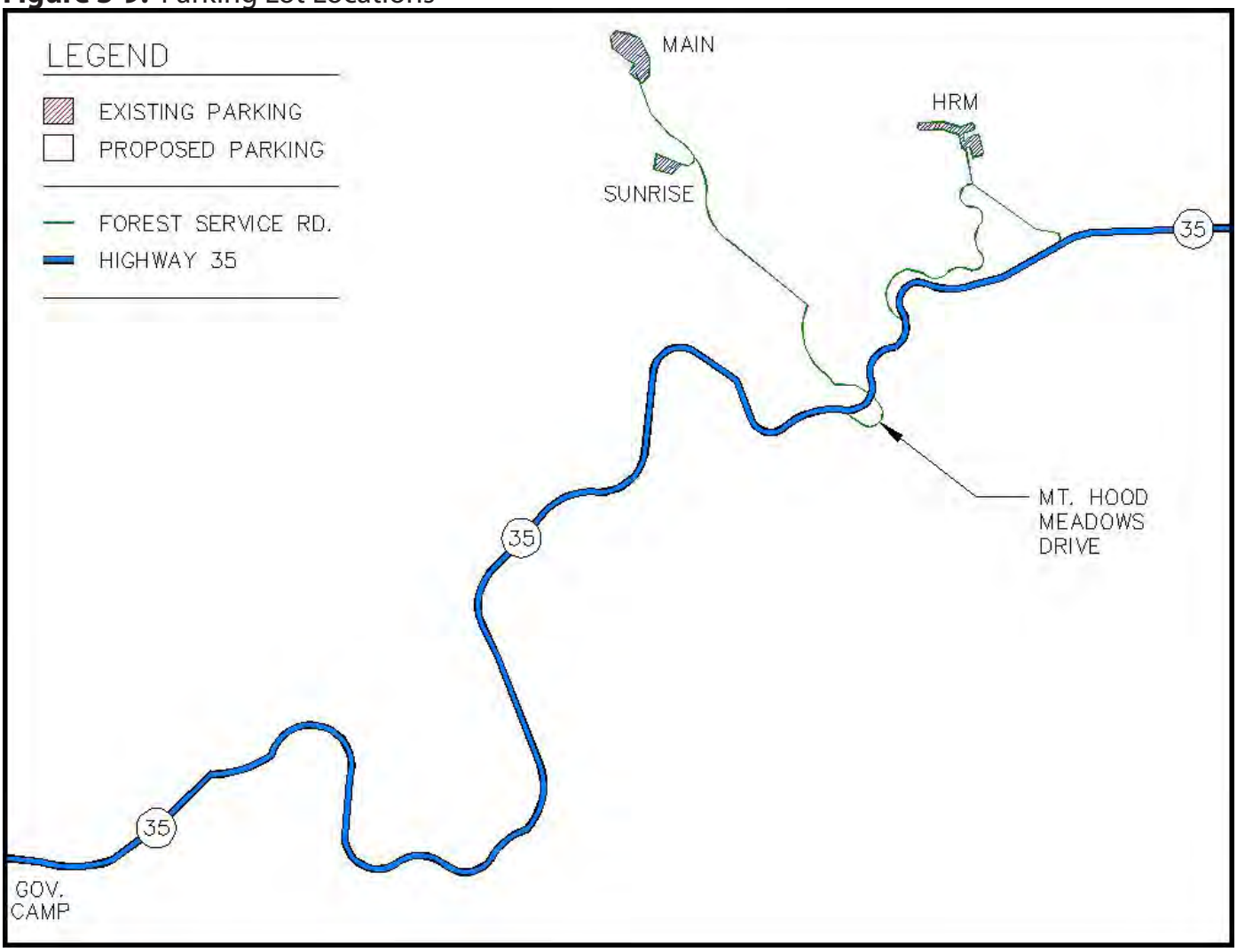
c. The *Mt. Hood Meadows section* includes both the Mt. Hood Meadows Main Driveway (Forest Service Road 3555) and the HRM Access Road (Forest Service Road 3545) along OR 35. Both driveways are two-way roadways that operate with stop control.

d. The *Hood River section* includes both the OR 35/E State Street intersection, an all-way stop-controlled intersection, and the OR 35/I-84 Westbound Ramp intersection, a signalized intersection in Hood River, Oregon.

For purposes of this analysis, it is assumed that the intersections are the capacity constraints in the transportation system. Thus, traffic operations analyses have been conducted only at the ten study area intersections. The study of the intersections included manual turning-movement counts on Saturday, January 28, 2012. All counts were conducted during the peak ski-season on this Saturday during the morning (8:00 to 11:00 a.m.) and evening (3:00 to 6:00 p.m.) peak time periods. Twelve hour counts (7:00 a.m. to 7:00 p.m.) were also conducted at the access road to the Main Parking Lot (Forest Service Road 3555) [referenced as Mt. Hood Meadows Main Entrance Driveway in the transportation study] and the HRM Access Road (Forest Service Road 3545). The analyses were performed at these intersections:

- Ski Bowl West Driveway/US 26
- Ski Bowl East Driveway-Government Camp West/US 26
- Government Camp Spur/US 26
- Government Camp East Driveway/US 26
- Timberline Highway/US 26
- US 26/OR 35 interchange
- Mt Hood Meadows Main Entrance Driveway/OR 35
- Hood River Meadows Driveway/OR 35
- OR 35/E State Street
- OR 35/I-84 On-Ramp

Figure 3-9: Parking Lot Locations



Peak hour or 30th highest hourly traffic volume is an estimate of the highest volume of traffic during a single hour that an intersection will experience. This volume is used as a design hour because it represents the most critical period for operations and has the highest capacity requirements. It is believed that the traffic counts conducted for this study (on January 28, 2012) represent the winter peak hour because all Mt. Hood National Forest (Forest) resorts were operating with all parking lots at capacity.

The analysis will consider a time horizon of 20 years as recommended by ODOT. The forecasts will be based on the following transportation conditions:

- Year 2012 existing traffic conditions along US 26/OR 35 within the site vicinity during the Saturday a.m. and p.m. peak periods;
- Developments and transportation improvements planned in the study area;
- Forecast year 2032 background traffic conditions (without the proposed Twilight Parking Lot) during the Saturday a.m. and p.m. peak periods;
- Trip generation and distribution estimates associated with the proposed parking lot; and,
- Forecast year 2032 total traffic conditions (with full build-out and operation of the proposed Twilight Parking Lot) during the Saturday a.m. and p.m. peak periods.

The growth rate used in this analysis was derived from a review of historical traffic data obtained from an Automatic Traffic Recorder (ATR), located along the US 26/OR 35 corridor approximately 0.02 miles west of the Warm Springs Highway. ATR #03-007 was installed in September 1995 and has been collecting traffic data 24 hours a day, seven days a week, for more than 16 years. Data from this ATR indicates that the ski months (November to March) can be highly variable depending on the start/end of the ski season. Therefore, the background growth rate was developed based on the average annual growth between 2001 and 2010 during the months of May through September. Using a conservative estimation, the annual growth rate was found to be approximately one percent. The one percent annual growth rate was not applied to the existing ski-related traffic along the corridor, as these volumes are unlikely to grow due to the lack of parking facilities at many of the Forest's ski resorts.

Safety analyses cited in this report have been conducted for the entire roadway corridor, including the intersections. The Road Safety Audits (RSA), completed in 2009 and 2011, provide a summary of anticipated potential safety improvements along US 26 and OR 35. As part of this report, no additional fieldwork or analysis was conducted; rather, the two studies were identified and reviewed in order to assess traffic safety within the site vicinity.

A Road Safety Audit (RSA) was completed for the segment of US 26 from Mile Post 47.0 to 54.3 (from the vicinity of the entrance to Camp Creek Campground to the intersection of Mt. Hood Highway and Timberline Highway, sections 1 and 2 in the study area) by Kittleson and Associates, Inc (KAI)in June 2009. The study resulted in a list of critical safety issues, their relative safety risk, and suggestions for improvement. As a result of the RSA, ODOT is proposing several improvements to further enhance safety on the mountain. In the short term, intersection safety and congestion issues within the Government Camp area do not have a proposed solution; rather, an investigation to make future improvements has been identified. In the long term (timeline undefined at this time), the following safety concerns and proposed solutions have been identified:

Table 3-15: Results of ODOT's Road Safety Audit 2009

Safety Concerns	Proposed Solutions
Intersection Crashes	Intersection realignment and spacing changes
Speed, rear-end and single car crashes	Speed reduction treatments
Speed, intersection crashes	Install street lighting
Poor intersection sight distance with snow	Widen snow storage areas
Unsafe westbound passing	Eliminate westbound passing in shared lane
Speeding, sideswipe, and rear-end crashes	Eliminate free right turn from southbound Timberline Highway or add an auxiliary lane
Intersection operations and safety	Traffic control alternative feasibility study

An additional safety study was also conducted along Mt. Hood Highway to the east of the Timberline access road (State Highway 173) in 2011 (sections 3 and 4 in the study area). The report was recently completed internally by ODOT, but is still in draft phase. The draft document shows that OR 35 traffic conditions are much worse than Highway 26 due to improper horizontal alignments, steep super-elevations, and narrower roadways. Crash rates in these sections are

more than triple the statewide average for rural highways, with nearly 80 percent of all crashes occurring in winter. The following behavior issues were identified by the 2011 RSA:

- Speeding;
- Risk taking;
- Lack of patience;
- Overconfidence; and,
- Lack of knowledge and experience in winter weather.

There were a range of projects identified to help lessen the safety risks. Possible solutions are summarized in the following table:

Table 3-16: Results of ODOT's Road Safety Audit 2011

	Short Term	Medium Term	Long Term
Findings	Speed is an issue with the most common driver error, additional police assistance and coverage needed.	Existing Oregon State Police (OSP) coverage does not respond adequately to incidents, traffic congestion in peak winter periods with relatively narrow sections, trees too close to the road, loss of control on sharp curves and steep slopes	Traffic congestion in peak winter periods with relatively narrow sections, trees too close to the road, loss of control on sharp curves and steep slopes
Solutions	**High Priority** – Consider preparing Public Service Announcements for winter driver preparedness. Consider including questions about winter driving requirements in the driver's license exam. Market TripCheck for real-time road conditions. Obtain funding for additional winter time short term police coverage.	**Medium Priority** – Remove trees that shade and contribute to ice on the highway. Propose new OSP boundaries and funding. Install Variable Speed Limit (VSL) system. Review no passing zones. Install larger signing.	**Additional studies** – Review feasible future mitigation options to reduce crashes with sharp curves. Review potential future locations for shoulder widening and replacing metal guardrail. Review potential future selected locations for additional chain up areas that could also be used for enforcement.

Kittleson and Associates Inc. is currently working closely with ODOT staff to develop mitigation measures for the Proposed Action. These measures could include using Transportation Demand Management principles and Intelligent Transportation System installations.

3.2.2. Existing Condition

The existing conditions identify the site conditions and current operational and geometric characteristics of the roadways within the study area. Field observations and inventories were conducted of the affected transportation facilities in the study area in January, 2012. At the time, information was collected regarding site conditions, existing traffic operations, and transportation facilities in the study area.

Site Description and Adjacent Land Use

The site is located adjacent to the existing Hood River Meadows (HRM) parking lot within the existing boundary of the Mt. Hood Meadows Ski Resort Permit Area. The site is located entirely within Hood River County, who have currently zoned this area as Primary Forest (F-2) land. The surrounding land uses consist of the Mt. Hood Meadows Ski Resort and undeveloped forest land.

Transportation Facilities

There are three existing parking lots that serve the Mt. Hood Meadows Ski Resort. The Main Lot (Main Lodge Base) has approximately 10 acres for parking, The HRM Lot (Hood River Meadows Base) has 8 acres, and the Sunrise Lot (Westside Base Expansion) has 3.8 acres. This information is summarized in the table below:

Table 3-17: Existing Parking Lot Summary

Existing Parking		
Lot	**Acres**	**Parking***
Main	10	1200
HRM	8	960
Sunrise	3.8	456

*assumes 120 parking stall capacity per acre

Public transit service is not provided in the area. However, many of the Forest's ski resorts and other private companies provide shuttle services along the US 26/OR 35 corridor. MHM currently operates a Park and Ride shuttle service on weekends and holidays from three locations throughout the Portland area, including Tualatin, Beaverton, and Gateway. The Sea to Summit Shuttle Service operates along US 26/OR 35 seven days a week from downtown Portland and the Hood River Area's B.R.T. (bed, ride ticket). The 4x4 Shuttle Service operates along US 26/OR 35 by reservation from Hood River.

There are no pedestrian or bicycle facilities along US 26/OR 35 in the study area and no on-street parking.

Traffic Volumes and Peak Hour Analysis

Separate system peaks were found to occur for each section. The morning peak hour within the Government Camp and US 26/OR 35 Interchange sections were both found to occur between 8:00 and 9:00 a.m. while the morning peak hour for the Hood River section was found to occur between 9:45 and 10:45 a.m. The morning peak hour of the Mt Hood Meadows section was found to occur at two distinct time periods, including 7:30 to 8:30 a.m. at the Mt. Hood Meadows Main Driveway (FSR 3555) and 8:45 to 9:45 a.m. at the HRM Access Road (FSR 3545). This is due in part to the nature of the accesses, with the Mt. Hood Meadows Main Driveway (FSR 3555) providing access to the primary parking facilities and the HRM Access Road (FSR 3545) providing access to the less preferential or perceived "overflow" parking facility.

The afternoon/evening peak hour for the Government Camp and US 26/OR 35 Interchange sections was found to occur between 3:00 and 4:00 p.m., while the afternoon/evening peak hour for the Hood River section was found to occur between 4:20 and 5:20 p.m. Similar to the morning peak hours, The afternoon/evening peak hour for the Mt Hood Meadows section was found to occur at two distinct time periods, including 2:55 to 3:55 p.m. at the Mt. Hood Meadows Main

Driveway (FSR 3555) and 3:10 to 4:10 p.m. at the HRM Access Road (FSR 3545). Summaries of turning movement counts can be found in the KAI report, "Mt. Hood Meadows Traffic Monitoring Report."

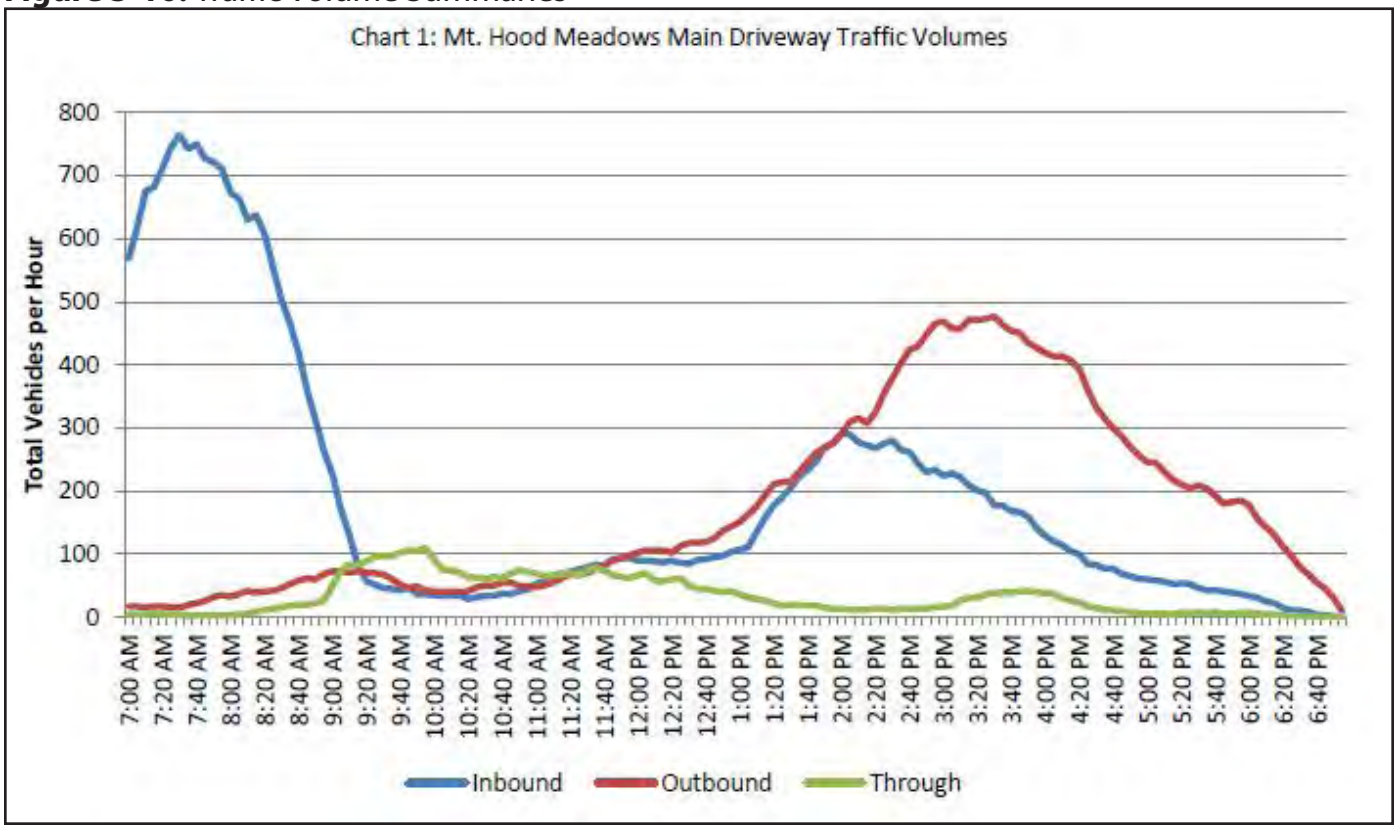
Table 3-18 shows MHM existing peak hour traffic and its orientation to/from the east and west. As shown, about 80 percent (1,068 of 1,344 vehicles) of MHM traffic travels to/from the west in the a.m. peak hour. Notably, however, only 70 percent (695 of 989 vehicles) travel to/from the west during the p.m. peak hour.

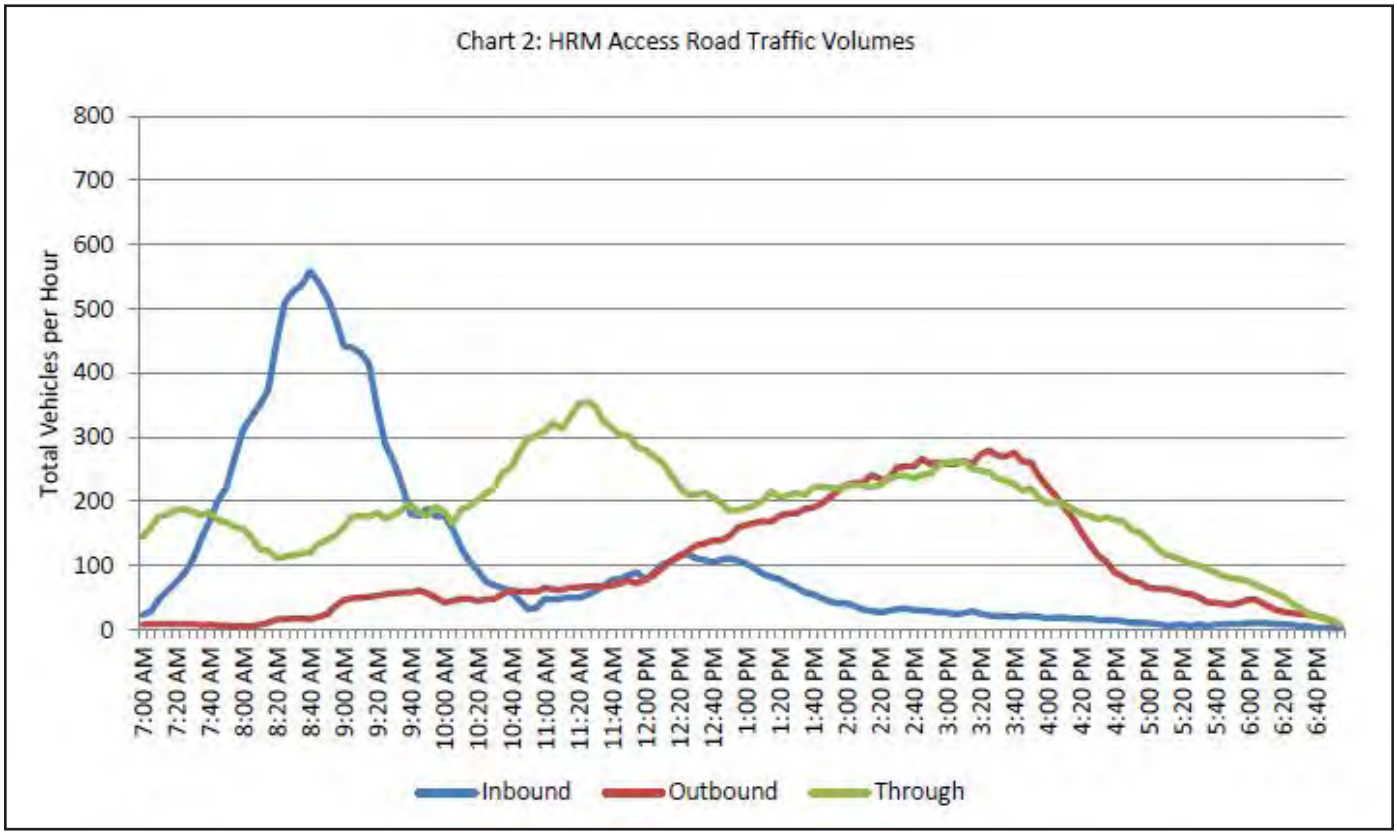
Table 3-18: Existing Mt. Hood Meadows Traffic

Traffic Direction	Main Access			Hood River Meadows Access			Total Mt. Hood Meadows Access		
	Gov. Camp	Hood River	Total	Gov. Camp	Hood River	Total	Gov. Camp	Hood River	Total
Weekend AM Peak Hour									
In	612	152	764	443	102	545	1055	254	1309
Out	4	11	15	9	11	20	13	22	35
Total	616	163	779	452	113	565	1068	276	1344
Weekend PM Peak Hour									
In	158	76	234	21	6	27	179	82	261
Out	331	134	465	185	78	263	516	212	728
Total	489	210	699	206	84	290	695	294	989

While there are separate peaks for the morning and evening peak periods at the MHM access roads, the evening peak period is less distinct: vehicles exiting the parking facilities tend to be staggered over a longer period. Figure 3-10 showing Charts 1 and 2 illustrate the peaking characteristics of the MHM access roads during the morning and evening peak time periods, as well as how each intersection peaks at different times, given the preferences of people to park in the Main lot versus the HRM lot. The through traffic shown in Chart 1 does not reflect traffic volumes along OR 35. Rather, the through traffic at this location reflects volumes at the MHM interchange that did not enter or exit the MHM Main access road (FSR 3555).

Figure 3-10: Traffic Volume Summaries





Traffic Safety

US 26 and OR 35 are designated safety corridors in Oregon. The Road Safety Audits provided a crash analysis of the study area for the last five years. In study area, sections one and two (US 26) there were 34 total crashes reported. Of those 34, nearly 62 percent of all crashes (21/34) occurred during the winter season. Forty-one percent of all crashes (14/34) occurred during Friday, Saturday or Sunday, between peak volume times of 6 a.m. to 6 p.m. The situation in study area sections three and four (OR 35) is much more treacherous due to less forgiving roadways and higher elevation. The total number of reported crashes in the past five years is 93 crashes. Winter season conditions contributed to 79 percent of those crashes (73/93) and 60 percent of all crashes (56/93) occurred during Friday, Saturday or Sunday, between peak volume times of 6 a.m. to 6 p.m.

The current average crash rate for these sections of US 26 and OR 35 is approximately 0.95 and 2.57 crashes per million vehicles, which are higher than the statewide average fur rural principal arterial highways of 0.70 crashes per million vehicle miles.

3.2.3 Effects Analysis/Environmental Consequences

Twilight Equipment Maintenance Yard (Bus Shop), Sunrise Vehicle Maintenance Shop, Nordic Trails Re-Routes, Nordic Guest Service Building, Sahalie Falls Hiking Trail (FS Trail #645) Relocation, Utility Line Installation and Wetland Relocation would not have any effects on transportation safety or traffic volumes. As such these actions will not be discussed any further in the transportation report because there are no direct, indirect or cumulative effects associated with these actions. The Twilight Parking Lot would have direct, indirect and cumulative effects related to traffic volumes, and the Left-hand Turn Lane and Twilight Parking Lot would have direct, indirect and cumulative effects on traffic safety. Each of these effects will be discussed in detail in the following sections.

Traffic Volumes Direct and Indirect Effects

Alternative 1 (No Action)

The transportation impact analysis identifies how the study area's transportation system is forecast to operate in the year 2032. In this case, no parking lot would be constructed and therefore, there would not be any growth in skier related trips. The one percent annual growth rate is ultimately applied to non-ski-related traffic along the corridor to reflect background traffic conditions. The non-ski-related traffic was determined by dividing the total number of vehicles that entered and exited the Ski Bowl, Timberline, and MHM access roads during the Saturday a.m. and p.m. peak hours by the total number of vehicles that entered and exited the study area from the east along US 26, the west along OR 35, or the south along US 26 during the same time periods. Using this methodology, the percentage of all non-ski-related traffic was found to be approximately two percent during the Saturday a.m. peak hour and 28 percent during the Saturday p.m. peak hour. As such, the one percent annual growth rate was applied to two percent of the volume of traffic moving through the US 26/OR 35 corridor during the a.m. period and 28 percent during the p.m. peak period. The higher percentage of non-ski-related traffic during the p.m. peak period is related to a higher volume of through traffic observed originating and terminating from outside the resort study area. With the additional one percent growth, all study intersections are forecast to operate acceptably during the Saturday a.m. and p.m. peak hours, with the exception of the Ski

Bowl East-Government Camp West/US 26 intersection, which is expected to continue to fail to meet ODOT's mobility standard during the weekday p.m. peak hour due to traffic associated with Ski Bowl.

Alternative 2 (Proposed Action)

Trip generation estimates for the proposed Twilight Parking Lot were developed based on traffic counts conducted at the MHM access roads and peak parking data provided by MHM. The total number of vehicles that entered and exited Mt. Hood Meadows Main (FSR 3555) and HRM Access Roads (FSR 3545) during the Saturday a.m. (1,353) and Saturday p.m. (990) peak hours were divided by the total number of vehicles parked in each parking lot during the peak time period (2,484) to develop a ratio of vehicle trips to parked vehicles. As such, the ratio for Saturday a.m. peak hour trips is 0.54 trips per parked vehicle (1,352/2,484=0.54) and for Saturday p.m. peak hour trips is 0.40 trips per parked vehicle (990/2,484=0.40). These ratios were applied to the proposed 878 space parking lot, assuming full occupancy during the peak time periods, to develop the trip generation estimates shown in Table 3-19. Table 3-19 also shows the trip generation estimates that are used for the analysis for each of the other action alternatives.

Table 3-19: Trip Generation Estimate

Alternative	Parking Stalls	Saturday AM Peak Hour			
		Ratio	Total	In	Out
2	878	0.54	475	461	14
3	915	0.54	495	481	14
4	598	0.54	323	314	9
5	830	0.54	449	436	13
6	878	0.54	475	461	14
Alternative	**Parking Stalls**	**Saturday PM Peak Hour**			
		Ratio	**Total**	**In**	**Out**
2	878	0.40	352	87	265
3	915	0.40	366	90	276
4	598	0.40	240	59	181
5	830	0.40	332	82	250
6	878	0.40	352	87	265

Table 3-20 below shows a summary of the Saturday peak hour trips generated by the Twilight Parking Lot. As shown, of the 475 a.m. and 265 p.m. peak hour trips, an estimated 369 (80 percent) and 196 (74 percent) travel to/from the west during the respective peak hours. Without any measures to change the trip generation demand profile or trip distribution pattern, the Twilight Parking Lot expansion could increase traffic in the Government Camp section by about 34 percent. As discussed later in this report, the required ODOT mitigation strategies (which would be implemented by MHM) are designed to eliminate or significantly reduce this impact.

Table 3-20: Mt. Hood Meadows Traffic (Alternative 2)

Traffic Scenario (Alternative 2)	To/From Gov. Camp	To/From Hood River	Total
Weekend AM Peak Hour			
Existing Traffic	1070	275	1345
Added Traffic	369	92	461
Total Mt. Hood Meadows Traffic	1439	367	1806
Weekend PM Peak Hour			
Existing Traffic	695	295	990
Added Traffic	196	69	265
Total Mt. Hood Meadows Traffic	891	364	1255

An operational analysis at the study intersections determined the year 2032 total traffic conditions. All of the study intersections are forecast to operate acceptably during the Saturday a.m. and p.m. peak hours, with the exception of four intersections:

- Ski Bowl West Driveway/US 26;
- Ski Bowl East Driveway-Government Camp West/US 26;
- Timberline Highway/US 26; and,
- OR 35/Button Junction.

These four intersections are expected to fail to meet ODOT's mobility standard during the Saturday p.m. peak hour and have a high impact on transportation congestion. The mobility standards help to maintain acceptable and reliable levels of mobility on the state highway system. They also help to define whether the transportation system in the study area is adequate. This scenario warrants a need to improve the existing and future (year 2032) conditions at the intersections that fail. However, it should be noted that state highway systems throughout Oregon are increasingly failing, causing more projects to be deemed "not-reasonably likely" to be built due to a lack of funding. While some failing transportation systems have projects in queue, it is within ODOT's jurisdiction to require enhancements to the intersections in question. It is safe to assume that adding traffic volumes to an already stressed transportation system would likely worsen transportation operations involved with congestion and safety. This could lead to longer trip times, and increased frequency in vehicular crashes.

Alternative 3 (New Nordic Trails)

The projected number of parking stalls increases from 878 to 915 in this alternative. The difference of 37 vehicles is not a significant addition to traffic volumes and thus would have a high impact to transportation, nearly equal to that of Alternative 2. The significance of these effects would very likely be equal to that of Alternative 2.

Table 3-21: Mt. Hood Meadows Traffic (Alternative 3)

Traffic Scenario (Alternative 3)	To/From Gov. Camp	To/From Hood River	Total
Weekend AM Peak Hour			
Existing Traffic	1070	275	1345
Added Traffic	385	96	481
Total Mt. Hood Meadows Traffic	1455	371	1826
Weekend PM Peak Hour			
Existing Traffic	695	295	990
Added Traffic	221	55	276
Total Mt. Hood Meadows Traffic	916	350	1266

Alternative 4 (Elk Meadow Master Plan)

With 598 provided parking stalls, this alternative adds a significant amount of parking but may not result in as high an impact when compared to Alternative 2 and 3. The Master Plan option has 280 less vehicle capacity than the Proposed Action alternative and subsequently would result in a medium impact to transportation functions in the US 26/OR 35 corridor. It is unknown exactly how many intersections would not comply with ODOT mobility standards, but it would hinder the existing condition. It is likely to increase trip times and number of vehicular crashes but not to the extent of Alternative 2 and 3.

Table3-22: Mt. Hood Meadows Traffic (Alternative 4)

Traffic Scenario (Alternative 4)	To/From Gov. Camp	To/From Hood River	Total
Weekend AM Peak Hour			
Existing Traffic	1070	275	1345
Added Traffic	251	63	314
Total Mt. Hood Meadows Traffic	1321	338	1659
Weekend PM Peak Hour			
Existing Traffic	695	295	990
Added Traffic	134	47	181
Total Mt. Hood Meadows Traffic	829	342	1171

Alternative 5 (Elk Meadow)

Comparing the Elk Meadow Alternative with 830 parking stalls to the Proposed Action shows a difference of 58 less vehicles. This amount would result in similar results to that of the Proposed Action and could have a medium to high impact to transportation operations. It would likely effect the same intersections as the Proposed Action alternative and can reasonably be considered to have an equally high impact. The significance of these effects would very likely be equal to that of Alternative 2 and 3.

Table 3-23: Mt. Hood Meadows Traffic (Alternative 5)

Traffic Scenario (Alternative 5)	To/From Gov. Camp	To/From Hood River	Total
Weekend AM Peak Hour			
Existing Traffic	1070	275	1345
Added Traffic	349	87	436
Total Mt. Hood Meadows Traffic	1419	362	1781
Weekend PM Peak Hour			
Existing Traffic	695	295	990
Added Traffic	185	65	250
Total Mt. Hood Meadows Traffic	880	360	1240

Alternative 6 (Preferred Alternative)

In this alternative, the parking lot size is the same as Alternative 2. As such, all the effects to traffic volume direct and indirect effects are the same as those discussed under Alternative 2 above. Table 3-20 shows a summary of the Saturday peak hour trips generated by the Twilight Parking Lot for this location. As shown, of the 475 a.m. and 265 p.m. peak hour trips, an estimated 369 (80 percent) and 196 (74 percent) travel to/from the west during the respective peak hours. Without any measures to change the trip generation demand profile or trip distribution pattern, the Twilight Parking Lot expansion could increase traffic in the Government Camp section by about 34 percent.

Traffic Safety Indirect and Direct Effects

Alternative 1 (No Action)

Without the additional Twilight Parking Lot, left-turn lane eastbound, and right-turn lane westbound, safety in the corridor would continue to be an issue in the year 2032. Despite acceptable performance considering ODOT Mobility Standards at the intersections, safety would continue to worsen due to background traffic growth. The presence of additional vehicles would result in more accidents and the added congestion would increase the prevalence of risky driving maneuvers.

All Action Alternatives (Alternatives 2, 3, 4, 5 and 6)

For each Parking Lot Alternative there are significant additions to traffic volumes, which directly effects safety in the US 26/OR 35 Highway Corridor. For purposes of this transportation analysis, these alternatives are assumed to have identical safety impacts on the transportation system.

As noted previously, the highway corridor is considered a safety corridor due to higher than average crash rates for Oregon rural highways. The addition of a parking lot and subsequent increases in traffic volumes would only burden the existing conditions. With increases in traffic volumes there would be increases in congestion. Congestion due to traffic volume growth would inevitably lead to an increase in risky maneuvering by impatient drivers. It is also likely the profile of travelers would not change, therefore adding more drivers with inadequate winter driving skills. The intersections that were listed to operate unsatisfactorily would likely receive the highest occurrence of crashes. The current rate of crashes are 0.95 and 2.57 crashes per million vehicles

and it is unknown if this rate would change. However, it would be conservative to assume that even if crashes rates remain static, there would be a higher occurrence of crashes due to the influx in traffic volume.

Providing both a left-turn lane eastbound, and a right-turn lane westbound at the existing access road would help to separate turning traffic from through traffic. Traffic operations at this intersection would improve for westbound traffic in Study Area 3. Current traffic volumes, making turns onto the access road, is expected to double. However, a right- and left-lane could mitigate the projected increase of visitors. Traffic safety could also be improved due to the lane separation of turning vehicles and through traffic. However, the improvement of traffic operations is only expected to improve at this local intersection and would only have a minimal positive effect on through traffic.

Cumulative Effects for All Alternatives

The spatial boundary for the cumulative effects projects considered are congruent to the study area boundary described previously in the Analysis Assumptions and Methodology portion of this transportation report. This spatial boundary is sufficient in consideration of cumulative effects as the majority of visitors access the Mt. Hood National Forest via US 26 or OR 35. The temporal boundary for transportation cumulative effects would forecast out to 5 years.

Table 3-24: Cumulative Effects for Transportation

Project Considered for Cumulative Effects	Potential Effects	Overlap in		Measurable Cumulative Effect Described Below?
		Time	Space	
Highway 35 betterment projects	Improved safety in the corridor	Yes	Yes	Yes
Meadows Creek Highway 35 and Teacup Roads culverts replacement	None	Yes	Yes	No
Teacup grooming activities	None	Yes	Yes	No
Bluegrass Ridge and Dollar Lake Complex Fires	None	No	No	No
Stadium Lift realignment	None	Yes	Yes	No
Buttercup Lift improvements	None	Yes	Yes	No
Annex Wetland restoration at Sunrise	None	No	Yes	No
General on-going road maintenance including winter road treatments	None	Yes	Yes	No
General on-going ski area activities	None	Yes	Yes	No
Sahalie Falls bridge stabilization	None	Yes	Yes	No
Pre-commercial thinning	None	No	No	No
Avalanche control	None	Yes	Yes	No

There are two Federal Highways Administration (FHWA) projects on OR 35 that are currently part of the Highway 35 betterment projects and that are under construction that would result in horizontal curves with spiral transitions and paved shoulders that would be 8 feet wide. These would be major improvements from milepost 61.1 to the White River and Clark Creek and increase safety in the study area.

In addition to the FHWA projects on OR 35, ODOT has plans to improve transportation safety operations within the spatial boundary with a few projects in the next 2 years. An asphalt overlay would help to smooth irregularities in the road surface from MP 49.2-62.15. The second project would remove a rock bluff to provide an adequate fall out area. This would increase safety by lessening the risk of maneuvering around large rocks or boulders blocking the roadways.

The Forest Service (FS) is currently undertaking a transportation planning effort for the Mt. Hood Area, in conjunction with ODOT and FHWA. The group is engaged in finding transportation solutions, in the next five years, with the objective of reducing congestion on US 26 and OR 35, provide greater highway safety for all travelers, increase ability of ski area operations, reduce environmental impact of vehicle use, and increase economic opportunities for recreation-related commercial enterprises. This study would then inform the Mt. Hood Multimodal Transportation plan, which has a more long-term vision of solutions, projecting out to 20 years, while continuing to focus directly on safety and travel options in the Mt. Hood Area.

The construction projects scheduled to occur within the next five years were identified through the road safety audits mentioned in this report. They were chosen for implementation to increase safety for travelers using this corridor. The planning efforts' goals hope to provide implementable projects that would reduce congestion for travelers using this corridor.

3.2.4 Consistency Determination

All analyses described in this report were performed in accordance with the procedures stated in the 2000 Highway Capacity Manual (HCM-Reference 1). ODOT uses volume-to-capacity (v/c) ratio standards to assess intersection operations. Table 6 of the Oregon Highway Plan (OHP-Reference 2) provides maximum volume-to-capacity ratios for all intersections located outside the Portland Metro area. Based on information provided in Table 6 of the OHP, the minimum required performance standard for all intersections located within the Government Camp and Mt. Hood Meadows sections is a v/c ratio of 0.80, while the minimum requirements for the intersections located within the Hood River section are 0.90 at the OR 35/E State Street intersection (hereafter called OR 35/Button Junction intersection) and 0.85 at the OR 35/I-84 Westbound On-Ramp. These mobility standards vary at the respective intersections due to the highway classification and area designation (urban vs. rural) of the particular section. ODOT mobility standards are not currently met, and would not be met in the future, at the three unsignalized intersections in the Government Camp section. The Mitigation Strategy below outlines the required mitigations from ODOT.

The objective of Mt. Hood National Forest Plan related to Transportation Systems/Facilities; Travel and Access is to manage the Forest transportation system and associated facilities to provide user safety, convenience, and efficiency of operations (FW-416). Each alternative listed provides users with convenient access to recreation, but may hinder key transportation operations of safety and efficiency by adding passenger vehicles to a safety corridor and creating

a substandard condition at multiple intersections. While access be limit opportunities for recreational access (FW-407) this could be considered consistent with the Forest Plan dependent upon management direction.

The A10 Developed Recreation (A10 B.) requirements include approval of site plan for construction, reconstruction, and maintenance. This would require MHM to coordinate with the Forest Service for approval of site plans for the Twilight Parking Lot. This project also meets the A10 Transportation Systems/Facilities; Travel and Management (A10 L.)

The Roads Analysis document is meant to inform decisions about managing the National Forest Transportation System to meet Forest Plan objectives. The analysis identified opportunities to align declining budgets with while keeping the road network open and free of safety hazards. These opportunities include: decommissioning, closing to vehicles, reconstructing, changing maintenance levels or continuing current management. The addition of new access roads would not meet the direction of the Forest Service to reduce the overall number of roads to maintain.

The 1997 Mt. Hood Meadows Ski Area Master Plan: Record of Decision (ROD) authorizes 30.5 acres of parking which would accommodate approximately 4,600 vehicles and 12,500 persons at one time. The addition of any alternative would not exceed the requirements set forth by the ROD.

3.2.5 Oregon Department of Transportation Mitigation Strategy

MHM is required to mitigating its impact at all intersections on US 26 and OR 35 that do not meet ODOT mobility standards. Thus, this section presents a proposed strategy to mitigate the impact of the additional 420 a.m. and 285 p.m. peak hour vehicles that would be introduced to the Government Camp section of Mt. Hood Highway as a result of the Twilight Parking Lot. The mitigation strategy for this section of US 26 focuses on reducing vehicle trips due to existing physical and environmental constraints. These constraints limit the ability to increase vehicular capacity, particularly for minor street traffic which is the primary concern. This mitigation strategy would be implemented with the oversight and direction of ODOT.

ODOT mobility standards would not be met at the OR 35/Button Junction intersection with the introduction of future trips generated by the Twilight Parking Lot. The Twilight lot would contribute an additional 105 a.m. and 95 p.m. peak hour trips to the Hood River section of Mt. Hood Highway. This impact would likely be greater with the trip diversion strategies that are proposed to in a later section. In addition to Transportation Demand Management (TDM) measures to reduce vehicle trips generated by MHM, a traffic signal at this intersection would improve future operations to acceptable levels. MHM would contribute an estimated 33 percent to 2032 weekend p.m. peak hour traffic volumes at the OR 35/Button Junction intersection. Accordingly, MHM should contribute 33 percent toward the cost of a future traffic signal at this intersection.

MHM has successfully executed a TDM program over the past decade to reduce its impact on FSR 3555 and to provide skiers options to travel to the mountain. These transportation options are described on MHM website4. The TDM measures include:

- Weekend Shuttle from Portland: MHM offers round-trip weekend and holiday transportation to the mountain from Portland. There are three Park and Ride pick up locations: Tualatin, Beaverton and Gateway. The motor coach drops you off right in front of the MHM main lodge.
- Express Shuttles: MHM offers express round-trip shuttles from various locations in Portland and Hood River.
- Overnight RV Parking: Available for stays of up to two days in MHM Main Parking lot.
- Carpool Matching Program: MHM maintains the Drive Less Save More website, in which travelers can log trip information to be matched with others going to the mountain.
- In addition, MHM is committed to improving travel options for skiers. The proposed TDM strategies are identified in Table 3-25 below.

Table 3-25: Transportation Demand Management Program

Category	Strategy	Potential Impacts
Employee Transportation	Increase Employee Shuttle Bus Routes and pick-up times	Increase employee ridership to over 12,000 per season and reduce peak hour trips by 150 vehicles
	Increase Employee Shuttle Bus Pick-up Times and Pick-up points	Increase employee ridership to over 12,000 per season and reduce peak hour trips by 150 vehicles
Subsidized Bus and Lift Ticket Packages	Increase bus subsidy	Increase bus ridership and reduce peak vehicle trips
Carpooling	Promote Carpool websites such as www.drivelessconnect.com www.mthoodrideshare.com	Increased carpooling and reduce daily and peak hour trips
	Creative Carpool incentive programs (discounts for food and merchandise)	Increased carpooling and reduce daily and peak hour trips
Third Party Transportation	Provide season pass incentives for third party transportation companies	Reduce daily and peak hour trips
Re-directing Traffic	Offer discounted lift tickets to Hood River lodging patrons	Reduce traffic impact through Government Camp
	Portable Variable Message Signs	Provide traveler information services, notify motorists of least congested routes and reduce traffic impact through Government Camp
Lift Access Pricing and Demand Spreading	Limited access season pass (significant discounts for midweek and night passes)	Attract season pass holders on non-peak days or times; reduce peak day/hour traffic
	Discount non-peak days	Attract season pass holders on non-peak days; reduce peak day traffic
	Discount non-peak shifts	Attract season pass holders at non-peak times
	Flexible pricing (user-defined, or price-per-lift option)	Reduce peak day/hours traffic
	Off-site ticketing limited for peak day/time	Reduce peak day/hours traffic
Seasonal Operations	Earlier opening time	Reduce vehicles on the roadway during current peak arrival time

The elements identified in the TDM program in Table 3-25 would:

- Reduce weekend vehicle trips to the mountain;
- More evenly distribute the arrival and departure demands during the a.m. and p.m. peak hours; and,
- Reduce vehicle trips traveling through the Government Camp section of US 26.

It is proposed that the strategies in the MHM TDM Program be employed to achieve the following two transportation objectives:

- Reduce weekend peak hour trips through the Government Camp section of US 26 to pre-Twilight Parking Lot levels after the opening of the Twilight Parking Lot; and,
- Improve operations at the OR 35/Button Junction intersection to meet ODOT mobility standards.

MHM prepares annual traffic monitoring reports that document its trip impacts. Accordingly, these monitoring reports would be used to monitor the effectiveness of the proposed TDM program, and to allow MHM to make adjustments to the strategies toward achieving the above transportation objectives.

3.2.6 Summary of Effects by Alternatives

Each of the alternatives, except Alternative 1 (No Action), may have an adverse impact on transportation operations of safety and congestion. The added traffic volumes for each alternative, except Alternative 1 (No Action), may increase the existing transportation safety issues of US 26/OR 35, which are currently labeled as safety corridors. Alternative 2, 3, and 5 would have the most effect on increasing transportation operations of safety and congestion.

The Highway 35 Betterment would help to improve roadway alignment conditions on OR-35 which would help with transportation safety operations.

3.2.7 Incomplete and Unavailable Information

All information needed to perform this analysis is complete and available.

3.3. Soil Productivity

More information is available in the project record including the full soils analysis file as part of the Soil Productivity Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.3.1 Methodology and Assumptions

Mt Hood Forest Plan

Exceptions to the Forest Plan standards are allowed under the Forest Plan, if they are identified during the interdisciplinary process. The exceptions were identified during the interdisciplinary planning analysis and the IDT process concluded that these exceptions were within the Purpose and Need for Action. Forest Plan page 4-45 states that for "should" standards "action is required; however, case-by-case exceptions are acceptable if identified during interdisciplinary project planning, environmental analyses. Exceptions are to be documented in environmental analysis (National Environmental Policy Act 1969) public documents."

The following Forest Plan Standards for Soil Productivity would not be met in any of the action alternatives within the footprint of where new buildings, roads, and parking lots (i.e., pavement) are proposed:

FW – 022, 023, and 024	The combined cumulative detrimental soil impacts occurring from both past and planned activities should not exceed 15% of an activity area. Landings, non-transportation system roads, and dispersed recreation sites should be included in the 15%. Rutting within skid trails should not exceed 12 inches in depth over more than 10% of the skid trail system (paraphrased).
FW – 032 and 033	Favorable habitat conditions for soil organisms should be maintained for short- and long-term soil productivity. At least 25 tons per acre should be maintained and evenly distributed across managed sites (paraphrased).

These standards would not be met because soils would be fully detrimentally damaged and devoid of organic matter where paved and otherwise developed, once the project is completely implemented.

Analysis Assumptions

The following assumptions were used in the soils analysis for this project.

- The footprint on alternative maps is the spatial boundary of disturbance.
- The PDC prescribed for each alternative will continue to be as effective as they have been in the past.
- Undisturbed soils meet the Forest Plan groundcover standards.
- Soil biological systems would properly function given certain habitat components are present, such as non-compacted soils, appropriate levels of organic matter, and types of native vegetation under which the soil developed.
- Soils under pavement and buildings are considered irretrievable resource commitments.
- The wetland at the location of the right-turn lane meets all morphological definitions, including soils, although only wetland plants were observed.

Methodology

The analysis areas for soil resources in this project coincide with the boundary lines of each project component in each of the alternative maps. Each type of soil is given a soil map unit (number) to show where they occur on a soil map. Then, each soil type is assessed for many risks and hazards called management ratings (e.g., erosion potential and compaction hazard), which are located in the Mount Hood National Forest Soil Resource Inventory (SRI, Howes, 1979). The scale at which the mapping was produced in the SRI is one inch to the mile, which makes it most useful as an initial broad-scale planning tool to identify and display maps of possible soil concerns or sensitive areas. Field reviews were conducted to validate the SRI and therefore ensure the accuracy of the ratings or make site specific modifications depending on the findings. Conditions discovered in the field as compared to the SRI are documented in the existing condition section below.

A comparison of alternatives will be conducted using applicable Forest Plan Standards and Guidelines as the method of measure (see Table 3-26) to assess the following three risk factors:

a. The risk of erosion and subsequent sedimentation of adjacent water bodies and/or wetlands.

Soil Erosion Potential Risk: The possible impact of concern stemming directly from soil erosion is runoff from bare areas carrying sediment that affect watercourses as defined by the Soil Resource Inventory (SRI). This hazard rating is based upon a particular soil's texture and slope for bare soil. This risk is mitigated through the achievement of the Forest Plan's effective groundcover standard (FW- 025).

b. The risk of detrimental soil conditions such as heavy compaction and disturbance that alter water movement through the soil and reduce site productivity.

Detrimental Soil Condition: The Forest's standard (FW- 22) of no more than 15% detrimental soil condition in an activity area following project completion would protect site productivity, maintain water movement through the soil, reduce erosion risks and associated sedimentation, and protect organic matter. This factor will only assess areas outside the footprint of the proposed pavement, buildings, and access roads; specifically the left-turn lane, Twilight Parking Lot (including the access road, equipment yard, and Nordic Guest Services Building), and the Sunrise Maintenance Shop (including access road). Therefore, the remaining areas included in the detrimental soil condition analysis are the proposed Nordic trails, Sahalie Falls Hiking Trail re-route, and utility lines.

c. The risk of altering the soil biological ecosystem because of insufficient amounts of down woody debris to feed forest carbon and nutrient cycles.

Organic Matter Levels: Poor or non-functioning soil biological systems may lead to difficulties in revegetation efforts, or decline in existing desirable vegetation. In and of itself, soil biology is extremely difficult to evaluate because of infinitely complex interactions occurring between organisms and their soil habitats, including physical and chemical characteristics. It is assumed that soil biological systems would properly function given certain habitat components are present, such as non-compacted soils, appropriate levels of organic matter, and types of native vegetation under which the soil developed. Again, this factor will only assess areas outside proposed pavement, buildings, and access roads; specifically the - left-turn lane, Twilight Parking Lot (including the access road, equipment yard, and Nordic Guest Services Building), and the Sunrise Maintenance Shop (including access road). Therefore, the remaining areas included in the Organic Matter Levels analysis are the proposed Nordic trails, Sahalie Falls Hiking Trail re-route, and utility lines,

Table 3-26: Summary of Forest Plan soil standards guiding the soils analysis. Full texts of these standards are on pages Four-49 and Four-50 of the LRMP.

Forest Plan Standard	Description of Standard
FW – 022, 023, and 024 (p. Four-49)	The combined cumulative detrimental soil impacts occurring from both past and planned activities should not exceed 15% of an activity area. Landings, non-transportation system roads, and dispersed recreation sites should be included in the 15%. Rutting within skid trails should not exceed 12 inches in depth over more than 10% of the skid trail system (paraphrased).
FW – 025 (p. Four-49)	In the first year following surface disturbing activities, the percent effective groundcover by soil erosion hazard class should achieve at least the following levels:

Soil Erosion Hazard Class	Effective Groundcover
Slight to Moderate	60%
Severe	75%
Very Severe	85%

FW – 032 and 033 (p. Four-50)	Favorable habitat conditions for soil organisms should be maintained for short and long-term soil productivity. At least 25 tons per acre should be maintained and evenly distributed across managed sites (paraphrased).

The methodology used to gather data needed for this analysis include field visits as well as previous field experience, which include numerous previous projects in the project area. Personal observation and conclusive knowledge of how soils respond to the proposed types of management actions was used to predict impacts.

3.3.2 Existing Condition

Soils within the analysis area are forming in old glacial deposits mixed with wind deposited volcanic ash. They are very gravelly and cobbly in the subsurface and typically have some wind-blown sandy loam deposited on the surface, the depth of which varies from just a few to several inches. Infiltration rates are very high allowing for rapid snowmelt and rainfall absorption. According to the SRI and field review, three soil types are mapped in the analysis areas.

Soil type 361: For all action alternatives, the proposed Twilight parking lot, including the Nordic Guest Services Building, replacement Nordic trails, utility lines, equipment yard with access road, Sahalie Falls Hiking Trail re-route, wetland relocation, and both turn lanes occur on this map unit. This landform is a series of immense glacial outwash debris fans, which are still active in the Clark and Newton valleys to the northeast. Several old inactive channels associated with Clark Creek cross the proposed parking lot and show clearly on the LIDAR map of the area (Figure 3-11). These channels are completely dry and had no evidence of any water flow. From ground level this appears as nearly flat to undulating topography, and is where the majority of the current Nordic trails are located. An existing exposure of this soil profile is in an old cutslope near the existing Nordic Guest Services Building in the HRM lot. Likely a good representation of the entire area, it shows several layered deposits of the various outwash events. A couple of the deeper deposits are almost completely made up of large cobble material with layers of sand and smaller round gravels interbedded. At the location of the right-turn lane, there is currently a small wet

area in the ditchline, which appears to have resulted from the cutslope intercepting a sufficient amount of groundwater to allow for wetland plants to populate a very narrow space only a few feet wide. While it is certainly possible this exact location may have had a small natural wetland, it appears more likely to have been artificially created by the roadcut/ditchline configuration. Additional information is in the Water Quality Section of the DEIS.

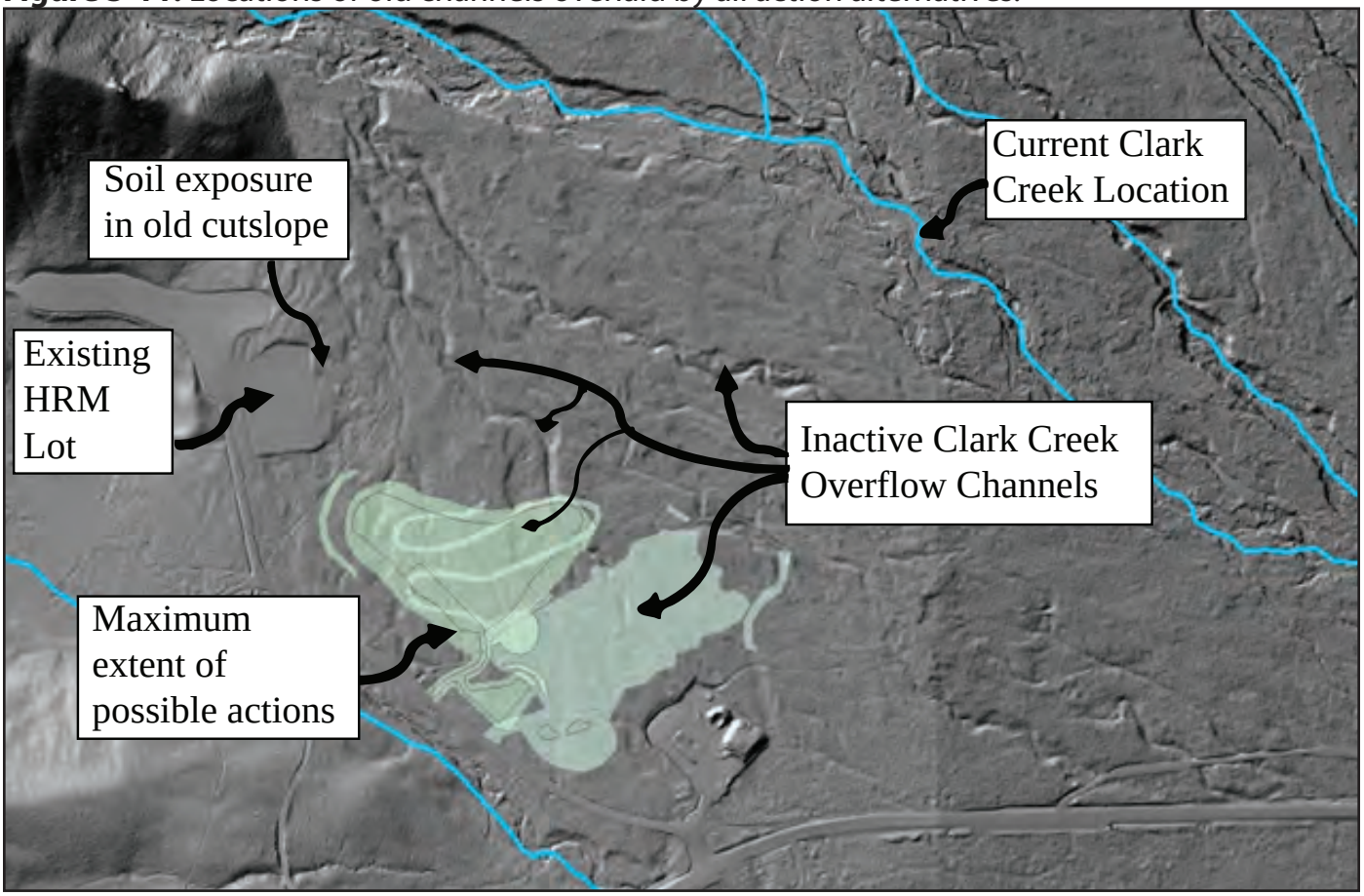
Soil type 379: The proposed Sunrise Maintenance Shop would occur on this map unit in Alternative 3. This is near the existing Administration Building at the main lot. A stringer of wet meadow lies just west of the proposed construction zone and makes its way down toward the existing Sunrise Parking Lot on to soil type 380, where it ties into Mitchell Creek. The topography of the west side of the proposed disturbance drops off toward the wetland.

Soil type 380: The proposed Sunrise Maintenance Shop would be constructed on this map unit in Alternatives 2, 4, and 5. The Alternative 2 location is directly adjacent to the existing Sunrise Parking Lot; and the Alternatives 4 and 5 location is along the main access road to the base area just east of the Alternative 2 location. A small rise separates the two potential locations.

Soil types 379 and 380 are derived from the same glacial deposit, with 379 being slightly higher in elevation and rock content than 380. These soils are so similar that they are expected to respond to disturbance in the same way.

A summary of soil mapping units and their pertinent associated management interpretations is located in Tables 3-27 and 3-28 below. Two ratings of soil type 361 have been changed to reflect field observations, and the updates will be considered in the analysis. Interpretations are basically predictions of how a soil would respond to a particular disturbance or land use, usually assigned by risk or potential ratings. Several soil and landform factors, inherent to any one certain soil were used to derive all the different ratings in the SRI as summarized in the tables below.

Figure 3-11: Locations of old channels overlaid by all action alternatives.



As defined in the SRI Interpretations Section, Surface Soil Erosion Potential is based on expected losses of surface soil when all vegetative cover, including litter, is removed. Evaluations of climate, slope gradient and length, soil texture and structure, soil permeability, and hydrologic characteristics of the soil and bedrock materials of each mapping unit are considered in making interpretations. Medium to coarse textured soils with rapid permeability and high porosity generally erode less than fine textured soils. However, these soils may be easily displaced by the forces of channeled water.

- A rating of Very Slight means practically no loss of surface soils materials is expected.
- A rating of Slight means little loss of soil materials is expected. Some minor sheet and rill erosion may occur.
- A rating of Moderate means some loss of surface soil materials can be expected. Rill erosion and some small gullies or sheet erosion may be occurring. Sheet erosion can be determined by some soil pedestals and considerable accumulation of soil materials along the upslope edge of rocks and debris. At this level of erosion there is a possible fertility loss.
- A rating of Severe means considerable loss of surface soil materials can be expected. Rill erosion, numerous small gullies, or evidence that considerable loss from sheet erosion may occur. Sheet erosion is indicated by frequent occurrence of soil pedestals and considerable accumulation of soil materials along the upslope edge of rocks and debris. This is accompanied by a probable fertility loss.
- A rating of Very Severe means a large loss of surface soil material can be expected in the form of many large gullies and/or numerous small gullies or large loss from sheet erosion.

Sheet erosion loss is exhibited by numerous examples of soil pedestals and extensive accumulation of soil materials along the upslope edge of rocks and debris. This is accompanied by fertility loss.

Compaction Hazard interpretation indicates a soils inherent ability to be compressed by ground yarding equipment to a point where plant growth is either slowed considerably or stopped. Soil factors evaluated in making this interpretation include: Soil texture, structure, bulk density, pore size distribution, and infiltration rate.

- A rating of Low means factors indicate the soil would resist compaction.
- A rating of Moderate means factors indicate the soil has tendencies to become compacted under tractor yarding operations. Time of operation is important on these soil units.
- A rating of High means factors indicate that soil compaction would be severe unless tractor yarding is curtailed until the soil has dried adequately.

Cutback Erosion Potential interpretation indicates the potential for subsoil erosion by running water of each soil. Subsoil refers to that material from approximately the 5-foot depth extending to bedrock. It includes erosion which takes place along ditches and on cutslopes. Rating is of soil material only and does not apply when cutbank or ditch is in bedrock. Factors considered in making ratings are field observations, texture and structure of subsoil materials, permeability, compaction, and climate.

- A rating of Low means factors indicate that little or no subsoil erosion is likely to occur.
- A rating of Moderate means factors indicate that the subsoils have moderate erosion potential.
- A rating of High means factors indicate that the subsoils are likely to erode severely.

Table 3-27: Summary of soil types in the analysis area and associated management interpretations taken directly from the Mt. Hood SRI.

Soil Map Unit	Surface Soil Erosion Potential	Compaction Hazard	Cutbank Erosion Potential
361	Moderate-Severe	Low-Moderate	High
379	Slight	Low-Moderate	Moderate
380	Slight	Moderate	Moderate

Table 3-28: Summary of soil types in the analysis area and associated management interpretations modified (highlighted in italics) by field observations in the analysis areas.

Soil Map Unit	Surface Soil Erosion Potential	Compaction Hazard	Cutbank Erosion Potential
361	Slight	Low-Moderate	Low
379	Slight	Low-Moderate	Moderate
380	Slight	Moderate	Moderate

Soil Erosion Potential Risk

No active erosion from previous and current vegetation management was observed during the field reconnaissance in the project area. The bare cutslope near the existing Nordic Guest Services Building mentioned above on soil type 361 appeared quite stable. The Nordic trails themselves, as well as existing powerline locations, were well vegetated and infiltration appears to be sufficient such that no overland flow was observed. A visual estimation concluded that effective groundcover exceeds 90%, which is well above the Forest Plan standard of 60% for a soil with an erosion potential rating of slight. Sections of the Sahalie Falls and Elk Meadows trails in the project area were observed and no signs of erosion were visible.

Implementation and effectiveness monitoring of many previous projects within the ski area has occurred over the past several years. One project in particular, the half pipe near the Buttercup Chairlift, has bearing on how we may expect revegetation to occur on constructed, steep, south facing slopes. This project occurred on soil type 379, and was completed in 2003, seeded and covered in jute matting for timely effective groundcover. Supplemental water via irrigation was also used to encourage vegetative recovery for the long term, since the matting would eventually decompose. Initially both the north and south facing slopes of the half pipe had spotty, well distributed germination and growth. Over time the north facing slope has continued to fill in with native plants, while the hot south facing slope has regressed to being almost bare jute matting. Although the matting is still providing the effective groundcover required to meet Forest Plan standards, it does present a long-term maintenance question regarding either re-applying jute matting every 10 years (give or take a few years) or considering a new strategy to get the vegetation well established so that no maintenance is needed.

Detrimental Soil Condition

Random shovel probes in the existing Nordic trails revealed decaying woody material, gravel, and cobble. Although there may have been some mixing of the soil profile when the trails were first put in, these areas are not currently considered to be in detrimental soil condition. No detrimental conditions were observed where new Nordic trails are proposed and therefore these trails meet the Forest Plan standard of 15%.

Organic Matter Levels

Visual observation of current organic matter levels in the project area concluded sufficient amounts to meet or exceed the Forest Plan tonnage standard on an average per acre basis. There are scattered acres where standing dead has not come down, but this is normal for this ecosystem.

3.3.3 Effects Analysis/Environmental Consequences

No Action Alternative (Alternative 1)

Soil Erosion Risk

The risk of erosion within the analysis area would remain as it is because the amount of groundcover protecting the soil surface from erosional influences easily exceeds the 60% required in the Forest Plan for soils with a slight erosion hazard rating. The expected effect of the no action is the landscape would respond and change proportionate to the severity of natural events such as storms or wildfire.

Detrimental Soil Condition

It is assumed that previously impacted soils would continue to recover and change at an unknown rate as roots, animals, and other influences slowly rebuild a topsoil layer in the mixed areas of the Nordic trails. The effect of soil recovery is a gradual increase in available soil (therefore nutrients and water) for all normally expected soil biological, chemical, and physical functions to occur. Approximately 14 to 20 acres of soil would not be committed as an irretrievable resource since none of the proposed parking, access roads, or buildings in any of the possible configurations would be constructed.

Organic Matter Levels

Soil organic matter and corresponding soil functions would continue to occur as they are in a general sense. Similar to erosion risk, the expected effect is that the soils at landscape and site scales would respond and change proportionate to the severity of natural events such as storms or hot wildfire. In addition, organic matter decomposition is influenced substantially by temperature, moisture, and fire, thus the rate of decay and cycling would continue accordingly (Graham, et al. 1994).

Direct and Indirect Effects Common to All Action Alternatives (Alternatives 2, 3, 4, 5 and 6) by Project Component

Nordic Guest Services Building: Since this component is included in the footprint of the proposed Twilight Parking Lot, the effects are included in the analysis for the Twilight Parking Lot discussed below.

Soil Erosion Risk

Left- and Right-Turn Lanes with Accompanying Wetland Relocation: Soil erosion risk would increase slightly during the time of implementation because bare soil would be exposed. As the amount of bare, bare/compacted soil increases, so does the risk of soil movement. Actual erosion and/or sedimentation are dependent on weather events that provide the energy to move soil material from one location to another. PDC have been prescribed to ensure erosion control during the construction phase to minimize the possibility of soil erosion occurring.

All Utility Lines: Soil erosion risk from this project component is nearly unchanged from the no action alternative due to the location and size of disturbance needed to install them.

Sahalie Falls Hiking Trail Re-location (Alternatives 4 and 5 only): The trial relocation would occur on the same soil type as the current trail, which has not exhibited any problems with erosion. Therefore, it is not expected that there would be any problems with the new trail.

Detrimental Soil Conditions

All Utility Lines: Previous experience with this type of project has shown that the primary soil impact is caused by mixing the soil profile in a very narrow strip along the utility line. Compaction and puddling has been localized and discontinuous, and the same would be expected when the new lines are installed in previously disturbed areas. Therefore, the detrimental soil standard would be met.

Sahalie Falls Hiking Trail Re-location (Alternatives 4 and 5 only): A small narrow amount of soil would be compacted in order to construct the new trail. However, as with the current trail, the amount of soil impacted would not cause a measureable decrease in soil productivity.

Organic Matter Levels

All Utility Lines (all alternatives) & Sahalie Falls Hiking Trail Re-location (Alternatives 4 and 5 only): Previous experience with this type of project has shown that the primary soil impact is caused by mixing the soil profile in a very narrow strip along the utility line. While there may be an occasional log that would need to be moved out of the way to allow for trenching, no net loss of organic matter as compared to the no action alternative is expected. Therefore, the organic matter standard would be met.

Direct and Indirect Effects Not Common to All Action Alternatives (Alternatives 2, 3, 4, and 5) by Project Component

Soil Erosion Risk

Twilight Parking Lot and Twilight Equipment Maintenance Yard (Including Nordic Guest Services Building and Access Roads): The soil erosion risk for these project components is primarily a function of the amount of ground that is open to the elements and for how long. The amount of ground exposed varies by alternative (see Tables 3-29 and 3-30 below), and for how long depends on when the project starts and must end due to weather. Soils would not only be exposed, but very disturbed due to the logging and clearing, including stump removal as preparation for the final grading and surfacing.

Table 3-29: Summary of Potential Exposed Ground by Action Alternative.

Project Component	Summary of Soil Impacts by Acres and Alternative				
	Proposed Action (Alternative 2)	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Twilight Parking Lot	9.4	13.8	8.0	11.3	9.4
Twilight Equipment Mtc Yard	3.8	3.8	2.6	2.6	3.8
Acreage Summary	13.2	17.6	10.6	13.9	13.2

In order to diminish the erosion risk while soils are exposed, certain erosion control techniques are practiced to lessen erosive energies. The effectiveness of these 'Best Management Practices', or BMPs, is discussed by Rashin et.al., 2006, in a recent publication of the Journal of the American Water Resources Association. Comparing the proposed actions to their application of studied BMPs would indicate the distance from the edge of disturbance to open running water, temporary erosion control measures, and would substantially reduce the risk of offsite impact should a storm event occur while the ground is exposed. By maintaining proper amounts of protective groundcover along with BMP design criteria, the slight erosion hazard rating inherent to the site and the risk of erosion and subsequent sediment delivery caused by the implementation of any of the alternatives is extremely small. Another method to compare the action alternatives is relative to one another, in which case the one with the most risk from an exposed ground perspective is Alternative 3, followed by 5, 2, and then 4 with the least amount of exposed ground.

Sunrise Vehicle Maintenance Shop: Particular to this project component is the hot south facing cut slope in Alternatives 2, 3 and 4. Specific Project Design Criteria (PDC) have been prescribed to address meeting the effective groundcover standard. These types of treatments have been effective on many other projects in the ski area. However, if there is no shade at all during the day, like at the half pipe near Buttercup, there may need to be further treatments (depending on the problem) to ensure a longer term success. The treatment would be identified through monitoring activities, and specific NEPA would be completed if required. Additional concerns, which are highlighted in detail in the Water Quality Specialist Report for this project are the proximity to Mitchell Creek in Alternative 2; and the proximity to a wetland in Alternatives 3 or 4 (same location). Strictly from an exposed ground perspective, and comparing one alternative to another in Table 3-30, the one with the highest erosion risk is Alternative 3 and 4, followed by 5 and 2.

Table 3-30: Summary of Potential Exposed Ground by Alternative.

Project Component	Summary of Soil Impacts by Acres and Alternative				
	Proposed Action (Alternative 2)	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Sunrise Vehicle Maintenance Shop	1.8	3.4	2.5	2.5	2.5

Nordic Trail Replacement: The erosion risk for all replacement trail locations is slight. Soils exposed during and immediately following trail construction would stabilize within the first year and remain on site due to the flat and slightly undulating nature of the area. Effective groundcover would likely be met by leaving existing groundcover in place, leaving at least some logging slash following construction, and needlecast from trees on each side of the trails.

Detrimental Soil Conditions

Twilight Parking Lot and Twilight Equipment Maintenance Yard (Including Nordic Guest Services Building and Access Roads), and the Sunrise Vehicle Maintenance Shop: These components are considered in the Forest Plan exception, and would not meet the detrimental soil condition standard. This standard would not be met because soils would be fully detrimentally damaged and devoid of organic matter where paved and otherwise developed, once the project is completely implemented.

Nordic Trail Replacement: The compaction hazard for all replacement trails is low to moderate and likely more on the low end given the lack of detrimental soil condition in the existing trail system. This is due to the amount of organic matter and rock present that help spread out the downward forces of machinery that would cause compaction on finer grained soils. Taking in to account the current condition and PDC to minimize compaction, it is expected that detrimental soil condition would remain under the 15% standard for all action alternatives. Table 3-31 below illustrates the relative amount of clearing needed by alternative.

Table 3-31: Summary of Potential Clearing for Nordic Trail Replacement by Alternative.

Project Component	Summary of Soil Impacts by Acres and Alternative				
	Proposed Action (Alternative 2)	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Nordic Trail Replacement	2.6	3.3	0	0.7	3.3

Organic Matter Levels

Twilight Parking Lot and Twilight Equipment Maintenance Yard (Including Nordic Guest Services Building and Access Roads), and the Sunrise Vehicle Maintenance Shop: These components are considered in the Forest Plan exception, and would not meet the soil organic matter standard. This standard would not be met because soils would be fully detrimentally damaged and devoid of organic matter where paved and otherwise developed, once the project is completely implemented.

Nordic Trail Replacement: Soil organic matter standards are expected to be met on all replacement trails. Trails are narrow (approximately 25 feet wide), and have adequate down and standing trees adjacent to them. Trail construction would also leave behind logging slash, some of which can be left on site in order to provide for long-term site productivity.

Cumulative Effects for All Action Alternatives

All projects in the Cumulative Effects project list located in the project record have been reviewed to ensure the accuracy of this section. There are two loosely related soils effects, both of which are covered in the Water Quality Specialist Report.

One of the effects is the implementation of the left-turn lane. The other is the additional gravelling of the Sunrise Lot if the Vehicle Maintenance Shop is located there (Alternative 2). Reference the Water Quality Report for a detailed cumulative effects analysis for these two impacts. Otherwise, there are no activities occurring in either time or space within the proposed project boundaries.

The method of soils analysis is cumulative by nature as explained in the Forest Plan on page Four-49 (for example FW-22). More clearly stated, an area (proposed activity) is evaluated by considering previous damage (if any) that still meets the detrimental condition definition, plus any expected detrimental soil impacts caused by the proposed actions. The spatial boundary is the disturbance footprint on each of the alternative maps.

3.3.4 Consistency Determination

The proposed action is consistent with all applicable laws, regulations, Mt. Hood Meadows Master Plan, and forest plan guidance with the exception of the identified standards already discussed at the beginning of this report.

3.3.5 Summary of Effects by Alternative

In summary, the following findings can be reported for all action alternatives:

A Forest Plan exception was used to exclude commonly analyzed soil standards (detrimental condition FW – 022, 23, and 24; and soil organic matter FW – 32 and 33) for parking, road access and building construction.

The only areas requiring full analysis regarding all applicable soil standards were the Nordic trail replacements, utility line installation, and cuts and fills outside the footprint of pavement and buildings.

Three risk factors were evaluated and addressed through forest plan standards and PDC:

- Soil erosion risk was assessed by ensuring effective groundcover standards were met per erosion hazard ratings in Table 3-28.
- Detrimental soil condition was assessed by ensuring the project impacts remain under 15% total (where applicable).
- Soil organic matter was considered to make sure soil biological systems continue to function properly (where applicable).

If an action alternative is chosen, there would be an irretrievable loss of soil resource (column X in the Acreage Summary of Table 3-32 below). Due to the total size in acres, Alternative 3 would be the most impactful overall. The Sunrise Vehicle Maintenance Shop has the least potential impact in Alternative 5 due to water and/or wetland considerations identified in Alternatives 2, 3, and 4. Alternatives 2 and 5 are nearly the same in overall acreage, but Alternative 5 maximizes the Twilight Parking Lot size in a different location, which then reduces the need to replace several acres of Nordic trail. Alternative 4 is the least impactful of all action alternatives due to the smaller footprint and location that reduces the need to replace Nordic trails.

Table 3-32: Summary of Soil Effects by Alternative.

Project Component	Summary of Soil Impacts by Acres and Alternative											
	No Action		Proposed Action (Alternative 2)		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
	X	DtM	X	DtM	X	DtM	X	DtM	X	DtM	X	DtM
Turn Lanes/Wetland Relocation	1.9*		3.6		3.6		3.6		3.6		3.6	
Twilight Parking Lot	0	13.8	9.4		13.8		8.0		11.3		9.4	
Twilight Equipment Mtc Yard	0	3.1	3.8		3.8		2.6		2.6		3.8	
Sunrise Vehicle Mtc Shop	0	3.4	1.8		3.4		2.5		2.5		2.5	
Nordic Trail Replacement	0	3.3		2.6		3.3		0		0.7		3.3

Table 3-32: Summary of Soil Effects by Alternative. (Continued)

Project Component	Summary of Soil Impacts by Acres and Alternative											
	No Action		Proposed Action (Alternative 2)		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
	X	DtM	X	DtM	X	DtM	X	DtM	X	DtM	X	DtM
Sahalie Falls Trail Realignment	0							0.1		0		
Nordic Guest Services Building**	0		0		0		0		0		0	
All Utility Lines***	0											
Acreage Summary	1.9	23.6	18.6	2.6	24.6	3.3	16.7	0.1	20.0	0.7	19.3	3.3
Total Impact Acres for this EIS	0		21.2		27.9		16.8		20.7		22.6	

X = acres exempted from meeting Forest Plan soil standards
DtM = acres Designed to Meet all Forest Plan soil standards
* There is an acreage impact of appx 1.9 within the footprint of the turn lanes due to the installation of the Meadows Creek culvert under the Highway 35 Betterment Project
** Included in parking lot footprint
*** See project description – acreage already disturbed or in roadways

3.3.6 Incomplete and Unavailable Information

All information needed to perform this analysis is complete and available.

3.4. Water Quality

More information is available in the project record including the full water quality analysis file as part of the Water Quality Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.4.1 Analysis Assumptions and Methodology

The following effects analysis utilizes research, relevant monitoring, field data and modeling to provide a context, amount and duration of effects for each of the alternatives.

GIS analysis and additional modeling was completed for a variety of site conditions and parameters in the project area. The Aggregate Recovery Percentage (ARP) model was used to determine whether watersheds in the planning area would meet Mt. Hood National Forest Land and Resource Management Plan (Forest Plan) standards. The ARP model is a standard tool used by many Forest Service resource specialists throughout the Pacific Northwest. The model calculates the "hydrologic recovery" of a watershed, which is based on the amount of human caused vegetation disturbance. This disturbance usually results from vegetation removal and road building. Some considerations about strengths and weaknesses associated with the analysis approach discussed in the following table.

Table 3-33: Strengths and Weaknesses of the Water Quality Analysis Approach

Analysis Approach	Strength	Weakness
Aggregate Recovery Percentage (ARP) Model	Gives a good general idea about potential hydrologic recovery in a basin. Model works well when followed up with field data such as stream surveys.	Model utilizes a number of GIS results and a growth simulation model to determine recovery. These may differ somewhat from what is actually on the ground due to mapping inaccuracies and actual site conditions.
GIS Generated Site Data	Provided more site-specific data for effects analysis. This led to a more accurate effects analysis.	Since layers in GIS are updated as new, more accurate data becomes available, there may be some inaccuracies in current mapping. Accuracy depends on the level of field verification.
Effectiveness of Aquatic Mitigation Measures and Design Criteria	Effectiveness of various erosion control measures in reducing erosion is well documented. General effectiveness of buffers in reducing sediment and other impacts is well documented.	Effectiveness of various buffer widths on reduction of effects to surface water is not extensively documented in a wide variety of physical settings.
Stream Inventories	Provided more site-specific data for effects analysis. This data has been collected in a Nationally standardized protocol by trained resource professionals.	Some of the inventories are older and some conditions may have changed between the time the data was collected and the present time.

The following assumptions are utilized in the Water Quality Analysis:

- All Best Management Practices (BMP) and Project Design Criteria (PDC) listed in EIS, Chapter 2 would be fully implemented and effective.
- The areas of impact outlined in EIS, Chapter 2 are actual areas of disturbance.
- The left-turn lane is located in a disturbed footprint associated with the Meadows Creek Fish Passage culvert. The fish passage culvert installation will occur at least 1 year left-turn.
- Most of the right-turn lane is located in the previously disturbed footprint of Highway 35.
- Monitoring effectiveness of PDC and compliance would be a component of project implementation.
- A large chemical spill (gas, oil or other material) would not be considered in this analysis because it is not a planned activity.
- All surface water areas have been identified through field work

3.4.2 Existing Condition

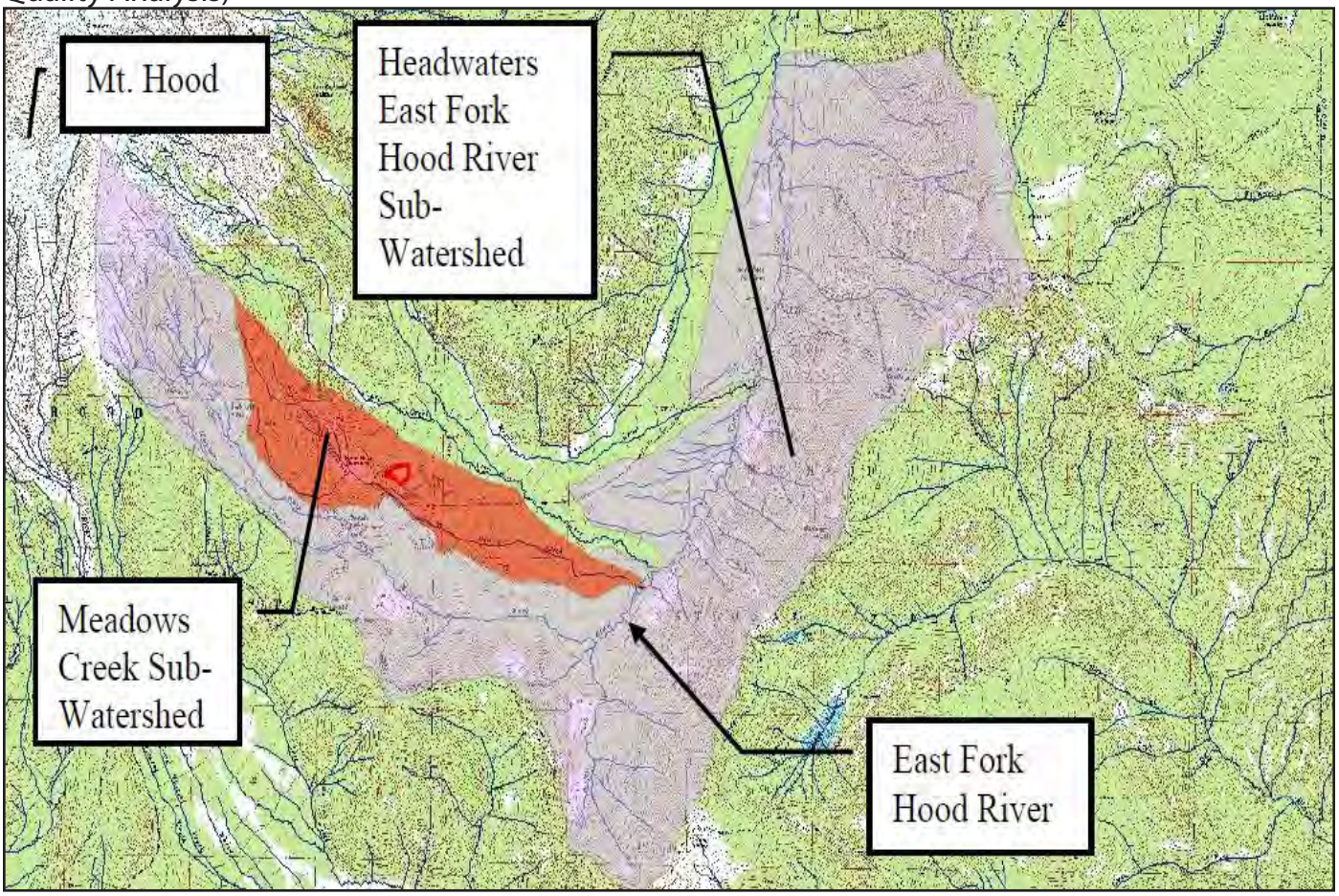
Water Quality

Hydrologic features in the Mt. Hood Meadows (MHM) Permit Area consist of several small streams, permanent snowfields at higher elevations, and wet meadows in areas of lower elevation. The existing Permit Area is drained by the East Fork Hood River and three main tributaries of the East Fork: Mitchell Creek, Meadows Creek, and Clark Creek.

The drainage areas within the Permit Area are all small (less than 3 square miles) and high in gradient (greater than 10 percent slope). The drainage pattern consists of a series of streams running in a southeast direction. The stream courses are generally well defined and typically shallowly incised. Streams in the area carry a heavy natural sediment load which originates mainly from upper elevation glacial action, wind and surface erosion, and mass failures. This heavy natural sediment load is a major influence on the character of these streams. In steep areas, the channels are typically cut to bedrock and the sides are steep and unstable. On flat reaches, the sediment load is deposited in deltas.

The area considered in this analysis is the Headwaters East Fork Hood River and Meadows Creek 7th field sub-watersheds. All of the proposed projects occur in these two sub-watersheds. Headwaters East Fork Hood River sub-watershed is 8101 acres and Meadows Creek sub-watershed is 1106 acres in size. These 7th field watersheds were used as the basis for the site-specific analysis, while the Upper East Fork Hood River 6th field sub-watershed was used for other, larger scale cumulative effects analysis and compliance with the Northwest Forest Plan (NWFP) Aquatic Conservation Strategy (ACS) Objectives.

Figure 3-12: Map of the Water Quality Analysis Area (7th field watersheds used in the Water Quality Analysis)



There are many streams, springs and wetlands located within these sub-watersheds. The primary streams include East Fork Hood River, Mitchell Creek and Meadows Creek. There are approximately 55 miles of stream in the National Forest portion of these 7th field watersheds in the following categories: 22 miles of perennial streams (flow year around) and 33 miles of intermittent streams (streams that dry up for part of the year and do not contain fish).

Rivers, streams, and lakes within and downstream of the treatment areas are used for boating, fishing, swimming, and other water sports. Additionally, the Forest streams provide habitat and clean water for fish and other aquatic biota, each with specific water quality requirements. The Clean Water Act (CWA) protects water quality for all of these uses.

The CWA requires States to set water quality standards to support the beneficial uses of water. The Act also requires States to identify the status of all waters and prioritize water bodies whose water quality is limited or impaired. For Oregon, the Department of Environmental Quality (DEQ) develops water quality standards and lists water quality limited waters. In addition, Region 6 of the Forest Service has entered into a Memorandum of Agreement (MOA) with the Oregon State DEQ to acknowledge the Forest Service as the Designated Management Agency for implementation of the CWA on National Forest System land. In an effort to support the CWA, the Forest conducts a variety of monitoring and inventory programs to determine status of meeting state water quality standards as well as other regulatory and agency requirements. In an average year, approximately 50 sites are monitored for water temperature throughout the Forest. In addition, other water quality monitoring occurs at various locations throughout the Forest depending on the year. This could be turbidity monitoring, instream sediment sampling, water chemical sampling, or surveys of physical stream conditions. Currently, approximately 25 miles of physical stream habitat is surveyed every year and to date approximately 1200 miles of stream have been surveyed. Some of the information collected during these surveys includes the number of pools and riffles, amount of large wood, riparian area condition and types, and numbers of fish and other aquatic organisms.

By direction of the CWA, where water quality is limited, DEQ develops Total Maximum Daily Load (TMDL) plans to improve water quality to support the beneficial uses of water. For water quality limited streams on National Forest System lands, the U.S. Forest Service provides information, analysis, and site-specific planning efforts to support state processes to protect and restore water quality. Once the TMDL plan is completed and accepted by the Environmental Protection Agency (EPA), streams would be removed from the 303(d) list and stream recovery would be achieved through an implementation plan. The TMDL plan for water temperature for streams in the Permit Area (West Hood Sub-basin) was completed and accepted by the EPA in 2002. In this document DEQ concluded that standard and guidelines in the Mt. Hood National Forest Forest Plan and the Northwest Forest Plan "meet the requirements of a TMDL management plan" (ODEQ 2001).

<u>Stream Temperature</u>: Water temperature data has been collected on Mitchell Creek and the East Fork Hood River since 1992 and Meadows Creek in 2001 through 2005. Maximum stream temperatures at the stations ranged as follows: Mitchell Creek = 32 to 58 degrees Fahrenheit (oF); East Fork Hood River = 35 oF to 60oF. All of these stream temperatures are below State of Oregon water quality standards of 64.4oF for the 7-day average maximum (salmon and trout rearing and migration).

Sediment: Turbidity measurements are taken hourly and suspended sediment daily at both monitoring stations mentioned above. Turbidity is the measure of the ability of light to pass through water, and is influenced by the amount of suspended sediment in the water sample (MacDonald et al., 1991). An analysis of this data was included in the East Fork Hood River Watershed Analysis. Results indicate that sediment "moves in these basins unevenly, in pulses" (W.A., H-6). No significant bank erosion or scour was noted for the period of record in the stream channels draining these stations, so the analysis concluded that primary sediment sources are "one or more of the following: naturally non-vegetated areas, human-disturbed areas, and aeolian (wind-deposited)". The analysis stated that the division between natural and human-caused erosion and sedimentation is "unclear". Eighteen months of suspended sediment data was compared between the control basin (Mitchell Creek) and the "managed" basin (East Fork Hood River) and each basin had approximately equal annual sediment load per unit land area. According to the analysis, the natural sediment load in both basins is "very high".

Roads and culverts are likely responsible for a large part of the anthropogenic sediment production in this area (W.A., H-6). Road density (miles of road per square mile of basin) can be used as a general indicator of the amount of potential sediment production associated with roads. Road densities within a sub-watershed that exceed 3.0 miles per square mile indicate areas that should be examined more closely for specific sediment related problems, although it is possible to have isolated areas of road instability even in areas of low road density. This road density value is also terrain dependent as lower road density on steeper terrain (greater than 55 percent slope) may be a concern while higher road density on gentler terrain may not be a concern. This is due to higher landslide and erosion concerns on steep terrain. This value is based on several years of observations by local area Forest Service hydrologists, fish biologists, and earth scientists. The road density for the project area Headwaters East Fork Hood River sub-watershed is 2.4 miles per square mile and the Meadows Creek sub-watershed is 3.2 miles per square mile. Although the Meadows Creek sub-watershed exceeds 3 miles per square mile, erosion and stability concerns are not present due to the flat terrain.

Chemical Contaminants: At least four categories of automotive products are potential contaminants to the aquatic environment from runoff of the Twilight Parking Lot and proposed new Sunrise maintenance shed. These are:

1. antifreeze,
2. fuel (gasoline and diesel),
3. lubricants (motor oil, gear oil and chassis lube) and
4. hydraulic fluids (brake fluids, power steering fluids and automatic transmission fluids).

These differ because antifreeze is soluble (infinitively miscible) in water while fuels and lubricants are nearly insoluble. With the exception of brake fluid, most hydraulic fluids are quite insoluble in water. Fuels are generally less viscous and contain a much higher fraction of volatile components than lubricants and hydraulic fluids.

Shepp (1996) compared total hydrocarbon contents from automotive sources in storm runoff from four urban settings: an all-day parking lot, a busy street, a gasoline station, and a convenience store parking lot. Highest hydrocarbon concentrations were found in runoff water from the convenience store parking lot and the lowest concentrations were from the all-day parking lot. Shepp suggests that seepage from oil bearing regions of a car are greatest during

"thermal expansion and contraction" or immediately after a car is started or shut off. He observed that high concentrations of hydrocarbons in parking lots are a function of two factors: 1) the duration of automobile exposure (i.e., the time a given impervious surface is exposed to hot vehicles in a thermal expansion mode); and 2) the volume of automotive exposure (i.e., the number of hot vehicles in a thermal expansion mode exposed to a given impervious surface). This would explain why a convenience store parking lot would have high concentrations of hydrocarbons when compared to an all-day parking lot. For a more detailed discussion of effects of these contaminants, see the Fisheries and Aquatic Fauna Specialist Report. This report is located in the project record, located at the Hood River Ranger Station in Mount Hood/Parkdale, Oregon.

Two monitoring efforts were completed in 2004 and 2005 to determine potential oil and grease contamination in East Fork Hood River and Mitchell Creek. East Fork Hood River adjacent to and downstream of the Hood River Meadows Main parking lot was monitored in 2005 and Mitchell Creek adjacent to and downstream of the Hood River Meadows (HRM) Parking Lot was monitored in 2004. Samples were collected during precipitation events at 3 sites on the East Fork Hood River and 4 sites on Mitchell Creek. Sampling next to the Main parking lot on the East Fork was completed prior to installation of the stormwater management system on the Main parking lot.

Six water samples were collected during two rain storms in April, 2005 in the East Fork Hood River. Two samples taken from the April 6, 2005 rain event contained 0.4 ppm of Hydrocarbons heavier than C24. These are heavier hydrocarbons, usually motor oil or weathered diesel (personal communication with Pyxus Laboratories – 2012). The rest of the samples were below the detection limits. As mentioned above, this sampling was completed prior to installation of the stormwater management system on the Main parking lot. Sampling post-stormwater system installation has not been completed to date.

Sixteen water samples were collected over four rain storms in late winter and spring, 2004 in Mitchell Creek. All of the samples except for one sample collected on January 23, 2004 were below the detection limit of 3 ppm. Possible sample contamination for the January 23, 2004 sample is suspected as it contains 3 mg/l of polar oil and grease, which are animal fats and vegetable oils (Hood River Meadows Monitoring Report – 2004). This is something that is not expected as a possible contaminant from the Main parking lot.

Flow/Hydrology

Peak Flow/Vegetation: Human activities such as tree removal and roads can influence the amount of water available for runoff and the timing of runoff, which may translate into increased peak flows (Harr, et al 1975, 1979, Harr 1979, Jones, et al 1996 and Wemple, et al 1996). These increased peak flows can cause stream channel damage in the form of increased bank erosion, channel scour, channel widening, and sedimentation.

Currently, 6.6 percent of existing forested land within the Permit Area has been converted to non-forest area. This would equate to an aggregate recovery percentage (ARP) of 93.4 percent (see Methodology and Analysis Points section for a discussion of ARP).

Peak Flow/Impervious Surfaces: Impervious surfaces are hard surfaces such as asphalt, concrete, rooftops, and highly compacted soils. Unlike pervious areas where soil and vegetation absorb

rainwater, impervious surfaces are areas that water cannot go through. Land cover that is impervious prevents rainwater from entering into the soil and forces it to run off the land until it finds a place where it can enter the soil or is incorporated into human-made drainage systems that carry it directly to a stream, lake, or estuary. Research has shown that as the amount of impervious surface increases, the amount of runoff generated increases. This increased runoff has the potential to scour streambeds, erode stream banks and cause sediment and other entrained pollutants to enter adjacent water bodies each time it rains (Shaver, et al., 2007).

A wealth of literature indicates relationships between the condition of aquatic habitat and biota relative to levels of impervious area (Karr and Chu 1999). Generally this literature supports the Impervious Cover Model (ICM) (Schueler 1994), which characterizes drainages with less than 10 percent total impervious surface area as "protecting" stream health, those with 10 to 30 percent total impervious surface as "impacted", and those with more than 30 percent total impervious surface area as "degraded". These values should be used as general guidance and may be slightly different depending on local factors such as soils, geology, forest cover, rainfall etc. (Booth et al. 2002, Brabec et al. 2002, Jones et al. 2002).

The percent of each 7th field sub-watershed that is in an impervious condition was calculated for each of the two sub-watersheds. Impervious surfaces used in this calculation include roads, parking areas and other facilities that have either roofs and/or compacted ground. Currently, Meadows Creek sub-watershed has 3.0 percent impervious surfaces and Headwaters East Fork Hood River sub-watershed has 1.2 percent impervious surfaces. These both would be rated as "protecting" stream health as defined by Schueler. It should be noted that all three of the existing parking lots at MHM have stormwater treatment facilities and work currently being done on Highway 35 includes installation of stormwater treatment measures onto the new road. The treatment facilities mitigate concerns associated with these impervious surfaces.

Groundwater: Groundwater is found throughout the Permit Area. Groundwater depths vary considerably and range from a few feet to hundreds of feet from the ground surface. Geologic conditions, soil type and precipitation are a few factors that help determine groundwater characteristics. Generally, soils in the ski area are highly permeable and surface water infiltrates quickly. The direction and speed with which groundwater moves are controlled by the slope of the watertable and aquifer permeability. Aquifer permeability is a measure of how easy it is for groundwater to move through the geologic material that makes up the aquifer. The steeper the slope of the watertable and the higher the aquifer permeability, the faster groundwater would move through a geologic formation. Depending on conditions, it can take anywhere from several hours to many decades for groundwater to move through an aquifer. Groundwater traditionally comes in contact with surface streams, lakes or ponds in the form of seeps or springs. These seeps or springs can be sources of high quality water due to their clean, cold condition.

3.4.3 Effects Analysis/Environmental Consequences

No Action Alternative (Alternative 1)

If Alternative 1 is implemented, conditions described in the existing conditions section would be maintained. No new parking lot, maintenance shop, and right- and left-turn lanes would be constructed.

Proposed Action (Alternative 2)

Water Quality

Stream Temperature: Vegetation removal near water bodies has the potential of increasing solar radiation to surface water which in turn may increase water temperature. The following analysis utilizes tools contained within the Northwest Forest Plan Temperature TMDL Implementation Strategy (USDA and Bureau of Land Management 2012) document to identify necessary shade so that stream temperatures would not increase as a result of the proposed project. The document is the result of work between the U.S. Forest Service and the Bureau Land Management (BLM) and identifies how to maintain sufficient stream shading to meet the Clean Water Act. The State of Oregon DEQ conditionally approved the Strategy in September 2005 as the temperature TMDL implementation mechanism under the Clean Water Act.

The concept of the sufficiency analysis is to identify a primary shade zone of vegetation next to the stream that maintains stream temperatures. In order to maintain sufficient shade next to the stream, the primary shade zone is untreated. The size of this zone is dependent on the current height of the trees and the hill slope. This relationship is shown in the table below.

Table 3-34: Width of Primary Shade Zone

Height of Tree	Hill slope <30%	Hill slope 30% – 60%	Hill slope >60%
Trees < 20 feet	12 feet	14 feet	15 feet
Trees 20 to 60 feet	28 feet	33 feet	55 feet
Trees 60 to 100 feet	50 feet	55 feet	60 feet
Trees 100 to 140 feet	70 feet	75 feet	85 feet

As an example, if the height of trees in the riparian area are predominately <20-feet tall, the primary shade zone would be 14 feet wide for an area that had 30 percent to 60 percent hill slopes next to the stream. Based on field observations in the project area, most of the hill slopes are less than 30 percent and existing tree heights range from 60-feet to 100-feet. This translates to a primary shade zone of 50' for the project area. There would be no direct or indirect effects to stream temperature from the proposed Twilight Parking Lot, maintenance shop and right- and left-turn lanes because the Proposed Action does not include any tree removal within the primary shade zone along perennial streams. This vegetation provides shade to the stream and influences water temperature.

Sediment: Some ground distubing activites in this alternative have the potential to dislodge soil particles which in turn may increase erosion. These activities include construction of the right- and left-turn lanes on Highway 35, construction of the Twilight Parking Lot with associated access road and bus shop, construction of the Sunrise Vehicle Maintenance Shop and landings, skid trails, yarding corridors, and burn piles associated with land clearing activites. A detailed discussion of soil erosion is contained in the Soils Productivity Specialist Report available in the project record. According to the soils analysis, amounts of erosion are expected to be small due to the natural erosion potential rating for soils in the area as "slight", maintaining protective groundcover along with implentation of Best Management Practices (BMP) or Project Design

Criteria (PDC) as they are referred to in this document. These measures include using silt fence, stabilizing disturbed areas with erosion control materials after construction, and removing excavated material and placing it in stable locations away from surface water. Personal field observations indicate these measures have been used successfully in past projects at MHM to minimize erosion and potential sedimentation. The effectiveness of these measures is also documented in the literature. Burroughs and King (1989) reported that measures such as erosion control blankets alone can reduce sediment production by 80 to 90 percent.

The chance of delivery of eroded soil material depends on a number of factors including slope, presence or absence of vegetated buffers or surface roughness factors and distance to adjacent streams. Portions of four activities would create disturbance within Riparian Reserves in Alternative 2 which is an initial indication that there may be a higher risk for sediment introduction due to proximity to surface water. These activities include the right- and left-turn lanes, a small portion of the access road to the Twilight Parking Lot with associated access road and bus shop, the utility line to the Twilight Parking Lot and the utility line to the new Sunrise Vehicle Maintenance Shop. The other activites not in Riparian Reserves such as the new nordic ski trails have no risk of sediment introduction since there is no connectivity with surface water. A total of 3.7 acres of disturbance would occur within Riparian Reserves.

Table 3-35: Disturbance in Riparian Reserves by Alternative

Activity	Sub-Watershed	Acres in Riparian Reserve by Alternative					Comment
		2	3	4	5	6	
Right- and Left-Turn Lanes	Meadows	2.9	2.9	2.9	2.9	2.9	85 percent is in already disturbed footprint of Highway 35
Twilight Parking Lot with associated access road and bus shop	Meadows	0. 5	0.4	0.9	0.8	0.5	
Utility Line - Twilight	Meadows	0	0	0	0	0	Already disturbed nordic trail
Hiking trail - Twilight	Meadows	0	0	0	0	0	
Nordic Trails	Meadows	0	0	0	0.1	0	
Sunrise Vehicle Maintenance Shop	Mitchell	0	1.5	0.1	0.1	0.1	
Utility Line – Sunrise	Mitchell	0.3	0	0.3	0.3	0.3	Already disturbed corridor
TOTAL		**3.7**	**4.8**	**4.2**	**4.2**	**3.8**	

Further assessement of site factors that influence the risk of sediment delivery to surface water is included in the table below. This table displays the closest distance an activity is from surface water, whether there is an intact vegetative buffer between the activity and surface water and provides a qualitative rating of that activity's connectivity to surface water. Studies centered around ground disturbance from timber harvest activities give some guidance about effectiveness of vegetated buffers and distance from surface water in relation to sediment delivery. Rashin and others (2006) looked at 21 harvest sites that had a variety of treatments ranging from no buffers to buffers up to 66 meters (216.5 feet) wide. They found that "Of 157 individual erosion

features determined to deliver sediment to streams during either the first or second year following timber harvest, 94 percent were located within 10 meters (33 feet) of the stream. Conversely, 74 percent of the 248 erosion features with no evidence of sediment delivery were greater than 10 meters from streams. The sediment routing survey results indicate that when erosion is initiated by ground disturbing activities within 10 meters (slope distance) of a stream, delivery of sediment was more likely than not." Other studies also support the effectiveness of reducing the risk of sediment delivery by maintaining a buffered area adjacent to surface water. Lakel and others (2010) looked at the effectiveness of a variety of treated and untreated buffers in trapping sediment adjacent to timber harvest units. They concluded that streamside management zones (buffers) between 25-feet and 100-feet were effective in trapping sediment before it could enter streams. These streamside management zones consisted of both treated and untreated areas.

Table 3-36: Qualitative Assessment of Connectivity to Surface Water For Disturbance in Riparian Reserves for Alternative 2

Activity in Riparian Reserve	Distance to Surface Water	Intact Buffer?	Connectivity to Surface Water
Left-Turn Lane	10 feet	No	High
Twilight Parking Lot with associated access road and bus shop	225 feet	Mostly Intact Except for Forest Service Road 3545	Low
Utility Line - Twilight	75 feet	Yes	Low
Utility Line - Sunrise	15 feet	Yes	Moderate-High

Although the left-turn lane has a high connectivity to surface water, most all of the work would occur on the previously disturbed footprint of Highway 35. This activity would employ erosion control measures consistent with the Highway 35 Betterment Project which are common methods utilized in the construction industry. These measures are recognized by regulatory agencies (such as the EPA) as effective in controlling discharge of pollutants when properly installed and maintained. In addition, a National Pollutant Discharge Elimination System (NPDES) permit and other applicible permits would be secured prior to construction, which would further identify efforts to minimize sediment introduction. Even with these erosion control techniques, there is a risk of some very small amount of soil expected to reach Meadows Creek due to the proximity of the work to the creek. The amount is expected to be very small and water quality standards are still expected to be met.

The 0.45 acres of disurbance from the Twilight access road would be new disturbance but this work would be more than 225-feet away from Meadows Creek that has a largely intact (except for Forest Road 3545) vegetated riparian area. Additionally, this area is very flat, most of it being <10 percent slope. The utility lines would be constructed on previously disturbed corridors that do not contain large trees. The utility line that would service the Sunrise Vehicle Maintenance Shop does run directly adjacent to a perennial wetland so soil disturbance would occur next to perennial flow. PDC and BMP would be empoyed to minimize the amount of disturbance and erosion so resulting sedimentation is unlikely.

Potential indirect effects associated with proposed activities in this alternative center around increased stream sedimentation and/or turbidity in Mitchell Creek. As described above, the potential for increased sedimentation into Mitchell Creek has nothing to do with construction

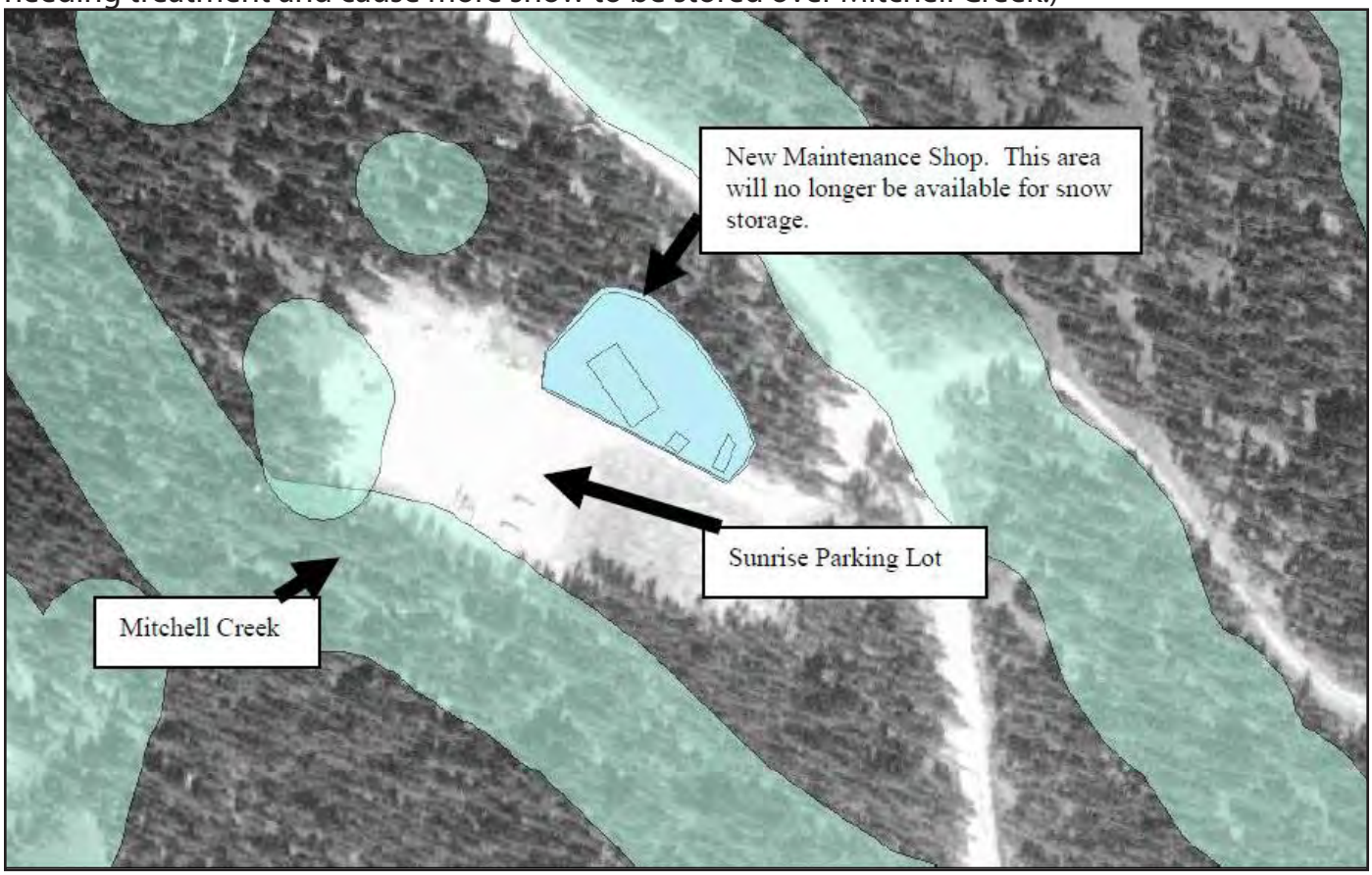
activities and the proposed location of the Sunrise Vehicle Maintenance Shop. The shop would be located across the parking lot from Mitchell Creek and erosion control during and after construction as outlined in the PDC would eliminate the possibility that sediment would enter Mitchell Creek as a result of the maintenance shop construction.

Once the maintenance shop is built, however, it is anticipated that snow removal strategies currently used would change so that snow is not blown or stored along the northern edge of the parking lot where the new Sunrise Vehicle Maintenance Shop would be located. This would result in more snow, and any associated gravel and/or soil, being blown or pushed and stored along other edges of the parking lot, including the southern edge that borders Mitchell Creek. The maintenance shop would also increase the overall amount of snow that would need to be treated in the Sunrise lot since it would increase the overall footprint by 1.8 acres or approximately 25 percent.

The actual increase in sediment that would reach Mitchell Creek is unknown. Now that the parking lot is paved, however, there is less of a chance that sediment would be caught up in blown/pushed snow than when the parking lot was aggregate surface. When the parking lot was paved, a bioswale was also built along the southern edge of the lot to intercept stormwater and pollutants before they reached Mitchell Creek. MHM also attempts to minimize sediment impacts to Mitchell Creek by not applying traction gravel unless absolutely necessary for safety purposes. If gravel is needed in the parking lot, it cannot be applied any closer than 130 feet from the southern edge of the lot to ensure that all blown snow would not go beyond the bioswale. Forest Service personnel, however, have observed some traction gravel between the bioswale and Mitchell Creek indicating at least some sediment ends up where it can then be transported into Mitchell Creek. Whether this sediment was due to blown snow or stored snow is unknown.

Any increase in sedimentation into Mitchell Creek resulting from changes in snow plowing is difficult to predict. The amount would likely be more than current levels, which is much less than historic levels due to paving and bioswale construction. Not all sediment that is deposited on the stream side of the bioswale would make its way into Mitchell Creek. Some would be captured by topography and/or vegetation. Any sediment entering Mitchell Creek would be a very small amount, but some small pockets of increased sediment would likely be present. Where this sediment would be stored depends on flows and where it enters the creek but in general the sediment from the parking lot is small enough that it would be deposited in slow water areas such as stream margins and pool habitat. The sediment would gradually move downstream and become dispersed over a much longer stream reach. Within 0.5 miles of the parking lot, the extra sediment would be immeasurable against background levels.

Figure 3-13: Map of the Alternative 2 Maintenance Shop Location (Photo showing the Sunrise Parking Area, the location of the Alternative 2 Maintenance Shop and Mitchell Creek. Riparian Reserves are shown in green. This shop location would increase the overall amount of snow needing treatment and cause more snow to be stored over Mitchell Creek.)



Chemical Contaminants: As discussed in the Existing Condition section, parking lots and other areas where motor vehicles are stored and/or repaired have a high potential of leaking some hydrocarbons out onto the ground. Since the proposed parking lots and maintenance shed have impervious surfaces, these pollutants have a chance to be mobilized and moved offsite during storms. For a complete discussion of potential direct and indirect effects of chemical contaminants on the aquatic environment, please refer to the Fisheries and Aquatic Fauna Specialist Report located in the project record. To summarize that section, PDC that include minimizing the amount of chemicals onsite and requiring installation of a storm water management system for the parking lots and maintenance shed would substantially reduce the likelihood of these pollutants delivery to both surface and groundwater resources.

Flow/Hydrology

Peak Flow/Vegetation: Alternative 2 would increase the watershed impact area from 6.4 percent to 7 percent in the Permit Area. This is still well below the Forest Plan Standard maximum of 35 percent so no detrimental effects due to peak flow increase from vegetation removal are anticipated.

Peak Flow/Impervious Surfaces: As discussed in the Existing Condition section, impervious surfaces have the potential to degrade the aquatic environment if they comprise a high percentage of the watershed area. Implementation of Alternative 2 would increase the impervious surfaces to 4.0 percent in Meadows Creek and maintain 1.3 percent in Headwaters East Fork Hood River sub-watershed. These values are still well below the threshold of 10 percent identified in literature as potentially starting to degrade the aquatic environment.

Additionally, as prescribed in the PDC, the parking lot and maintenance shed would utilize EPA technical guidance outlined in EPA 841-B-09-001 for design of stormwater facilities where site conditions allow. The objective of this guidance is to "replicate the pre-development hydrology to protect and preserve both the water resources onsite and those downstream" (EPA 2009). The result of implementing this guidance would be to "eliminate or minimize the erosion of streambeds and streambanks, significantly reduce the delivery of many pollutants to water bodies, and retain historical instream temperatures."

Groundwater: As described in the Impervious Surface section of this report, the parking lot and maintenance shed would utilize EPA technical guidance outlined in EPA 841-B-09-001 for design of stormwater facilities where site conditions allow. The purpose of this guidance is to employ treatment systems that mimic natural processes including infiltration and recharge of groundwater systems. Utilizing this design guidance would ensure pre-development hydrology including groundwater recharge are maintained.

Wetlands: Construction of the right-turn lane would fill in a small, linear wetland that has developed in the ditchline on the north side of Highway 35. The wetland is approximately 1 foot wide and 250 feet long. It appears to have been formed partially by interception of groundwater by construction of the ditchline and snowmelt runoff from the forested area to the north. This wetland would be reconstructed in the ditchline adjacent to the new right-turn lane approximately 10 feet to the north of the existing wetland. It is expected that the hydrology that formed the existing wetland would be present in the new location, since it is so close and no conditions were observed that might interrupt flow between the two areas.

Summary of Indirect/Direct Effects

Most detrimental effects to water quality would be reduced or eliminated through implementation of PDC and BMP in Alternative 2. The only projects that may have some risk of direct/indirect detrimental effects to water quality are the left-turn lane on Highway 35 and addition of the maintenance shop to the Sunrise parking lot. These projects may result in some indirect sediment introduction which would be limited in scope due to PDC and BMP. In addition, construction of the right-turn lane would fill in an existing wetland in the road ditchline, but the feature would be reconstructed in the new ditchline as part of the design. The table below is a summary of the changes to water quality indicators between Alternative 1 and 2.

Table 3-37: Summary of water quality indicators for Alternative 2.

Water Quality Effects Measure	Alternative 2	Change from Alternative 1	Applicable Threshold of Concern
Percent of Sub-watershed in Impervious Surfaces	4.0% in Meadows Creek; 1.3% in Headwaters East Fork Hood River	Increased by 1.0% in Meadows Creek; Increased by 0.1% in Headwaters East Fork Hood River	Concern if Total Impervious Surface Greater than 10%
Acres of Disturbance in Riparian Reserve	3.7 Acres	Increased by 3.7 Acres	No Threshold

Cumulative Effects

The table below provides a qualitative summary of potential cumulative watershed effects. It shows past, present and reasonably foreseeable future projects, effects from those projects that may result in cumulative effects with Mt. Hood Meadows Parking Lot Improvement EIS, whether these projects overlap in time and space and an assessment if a measureable cumulative effect is expected. Findings of this summary are supported by the analysis above which utilizes pertinent research, PDC, BMPs, and applicable management standards and guidelines.

Table 3-38: Cumulative Effects for Water Quality

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?
		Time	Space		
Past MHM Ski Area Projects	Stream Temperature	No	Yes	No	Projects are completed. No remaining sediment, stream temperature and water quantity effects due to mitigation measures and design criteria implementation on the original projects and natural recovery.
	Suspended Sediment	No	Yes	No	
	Water Quantity	Yes	Yes	No	
Highway 35 Betterment Project – Clark Creek Wetland Enhancement	Stream Temperature	Yes	No	No	Mt. Hood Meadows Parking Lot Improvement Project would maintain the primary shade zone so there should be no increase in stream temperature.
	Suspended Sediment	Yes	No	No	There may be an overlap in timing of this project with the Mt. Hood Meadows Parking Lot Improvement Project; any minor suspended sediment would not be measurable due to implementation of PDC and conformance with existing standards and guidelines in both projects. Additionally, no mixing of sediment from either project is expected due to the long distance from project areas to the confluence of Meadows Creek, Clark Creek and the East Fork Hood River.
Stadium Lift, Blue Wetland Enhancement and Access Road Culvert Replacement	Stream Temperature	Yes	Yes	No	Mt. Hood Meadows Parking Lot Improvement Project would maintain the primary shade zone so there should be no increase in stream temperature.
	Suspended Sediment	Yes	No	No	There may be an overlap in timing of this project with the Mt. Hood Meadows Parking Lot Improvement Project; any minor suspended sediment would not be measurable due to implementation of PDC and conformance with existing standards and guidelines in both projects. Additionally, no mixing of sediment from either project is expected due to the long distance from project areas to the confluence of Meadows Creek, Mitchell Creek and the East Fork Hood River.
Highway 35 Betterment Project – Meadows Creek Culvert Replacements	Suspended Sediment	Yes	Yes	No	The culvert replacements would temporarily increase suspended sediment and turbidity immediately after project completion in 2012. This increase is expected to be of short duration as stream flow is returned to the culvert. The project in the Mt. Hood Meadows Parking Lot Improvements EIS most likely to have a potential for a cumulative effect is construction of the left-turn lane, but any minor suspended sediment would not be measurable due to implementation of PDC and conformance with existing standards and guidelines. This work would be asynchronous with any sediment effects from the culvert installations.
Sunrise and Hood River Meadows Parking Lots	Stream Temperature	Yes	Yes	No	Mt. Hood Meadows Parking Lot Improvement Project would maintain the primary shade zone so there should be no increase in stream temperature.
	Suspended and Bedload Sediment	Yes	Yes	Yes	There would be an overlap in timing of effects with activities associated with these facilities and the Mt. Hood Meadows Parking Lot Improvement Project. Since the new Sunrise Vehicle Maintenance Shop would be located on an extension of the existing Sunrise Parking Lot footprint, activities associated with vehicle traction and snow management would have the potential to add more sediment into Mitchell Creek. The amount would be minimized due to implementation of PDC and conformance with existing standards and guidelines in both projects.
	Chemical Contaminants	Yes	Yes	No	There would be an overlap in timing of effects with activities associated with these facilities and the Mt. Hood Meadows Parking Lot Improvement Project. Since the new Sunrise Vehicle Maintenance Shop would be located on an extension of the existing Sunrise Parking Lot footprint, runoff containing chemical contaminants from the maintenance shop would have the potential to add to similar contaminants that are currently originating from the existing Sunrise Lot. The total amount of contaminants ultimately reaching Mitchell Creek would be minimized due to implementation of PDC and conformance with existing standards and guidelines in both projects.
	Water Quantity	Yes	Yes	No	There would be an overlap in timing of effects with these facilities and the Mt. Hood Meadows Parking Lot Improvement Project. The highest potential is the new Sunrise Vehicle Maintenance Shop located on an extension of the existing Sunrise Parking Lot footprint. Runoff quantity from the maintenance shop would have the potential to add to runoff currently originating from the existing Sunrise Lot. The potential cumulative effect would be minimized due to implementation of PDC and conformance with existing standards and guidelines in both projects.
ODOT sand shed operation and maintenance	Suspended and Bedload Sediment	Yes	Yes	No	Storage of sanding material and ingress and egress of sanding trucks increases risk that some traction sand could wash from storage area and/or moving trucks into Meadows Creek. Risk quite small given proximity to Meadows Creek and presence of Highway 35 and Forest Service Road 3545 between shed and creek – routing sediment away from creek.
Highway 35, Forest Service Road 3555 and 3545 sanding for vehicle traction	Suspended and Bedload Sediment	Yes	Yes	Some sediment increase possible but likely not measurable against sanding material background	Applying traction sand on roads could potentially increase delivery of bedload and suspended sediment to adjacent surface water. This material could mix with eroded soil from the Mt. Hood Meadows Parking Lot Improvements EIS project. The project most likely to have a potential for a cumulative effect is construction of the left-turn lane. Some sediment would enter Meadows Creek from the construction area but the amount would be minor and localized near the Highway. This addition of sediment would only occur for a short period following construction, one year or less.

Stream Temperature: No detrimental cumulative effects are expected as a result of increased water temperature due to PDC that maintain existing primary shade vegetation adjacent to streams. As described in the direct and indirect effects section, this project would maintain existing water temperatures.

Sediment: Some detrimental cumulative effects are expected as a result of sediment introduction, primarily in the section of Mitchell Creek adjacent to the Sunrise Parking Lot. This cumulative effect is expected to be very small and localized due to the small amount of sediment expected. There is also some risk of sediment from construction of the left-turn lane mixing with winter traction sand material on Highway 35. This risk would be greatest the year following construction of the left-turn lane. The amount of traction sand material would mask any eroded material from construction activities. As described in the direct and indirect effects section, PDC aimed at minimizing erosion and sedimentation reduce the potential of erosion and delivery of the material to adjacent surface water.

Chemical Contaminants: No detrimental cumulative effects are expected as a result of chemical contaminates due to PDC minimizing the amount of chemical contaminates onsite and routing stormwater runoff through treatment facilities.

Water Quantity: A peak flow analysis was completed for this project and is displayed in the Effects Section above. This project along with other projects on and off National Forest lands were included in the Watershed Impact Area calculation (Forest Plan Standard FW-067, pg. Four-55) and the sub-basins were found to be in compliance with Forest Plan Standard FW-064 so no cumulative effects are anticipated for water quantity. In addition, total impervious surface values for the sub-watersheds are below thresholds of concern identified in literature.

Alternative 3

Water Quality

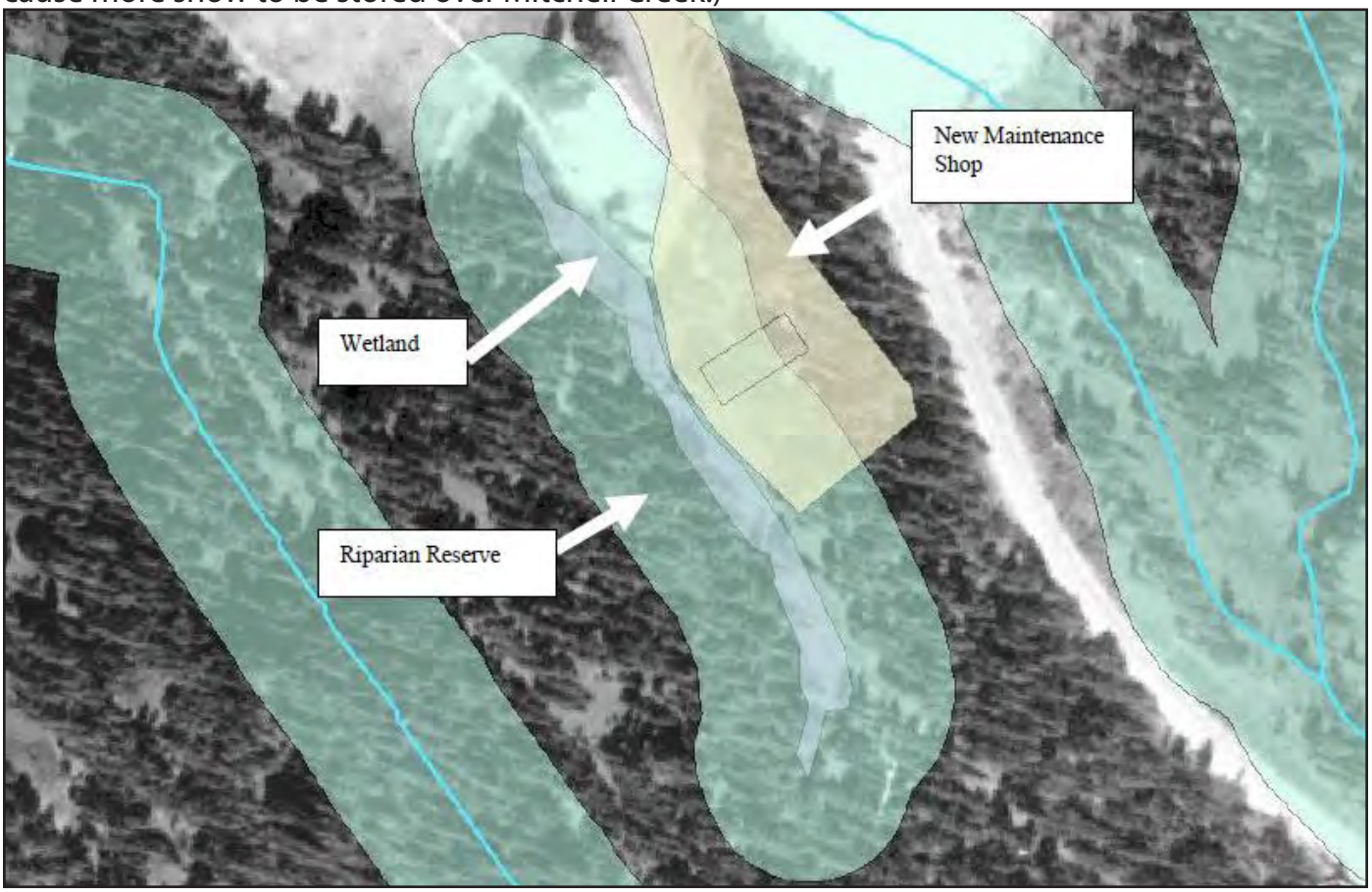
Stream Temperature: Effects to stream temperature for Alternative 3 would be similar to those described for Alternative 2 with the exception of the new Sunrise Vehicle Maintenance Shop. The new shop would be located near the existing Administration Building, adjacent to a small unnamed perennial wetland/stream. Existing large trees that are currently providing shade to the wetland/stream would be removed to facilitate the new location of the Sunrise Vehicle Maintenance Shop. This would likely increase water temperature since there would be approximately 400 linear feet of primary shade zone vegetation removed. This increase would be localized since this feature is not directly linked to Mitchell Creek which is approximately 1400 feet downstream. Water flow goes subsurface above the Sunrise wetland restoration project prior to reaching Mitchell Creek.

Sediment: Direct and indirect effects from sediment for Alternative 3 would be similar to those described for Alternative 2. Concerns over sediment introduction to surface water from traction gravel application and snow removal activites at the maintenace shed are still present in Alternative 3. The location of potential effects changes to an unnammed tributary wetland/stream to Mitchell Creek. Due to the Sunrise Vehicle Maintenance Shop location directly adjacent to this aquatic feature, snow containing traction material would likely be blown out over it during the winter. As described in Alternative 2, the current snow removal plan would greatly minimze, but not totally eliminate, the amount of material that would potentially be introduced to the wetland.

Based on past field observations, the potential amount is very small, likely fitting in a quart sized container. This sediment would not reach Mitchell Creek as flow goes subsurface prior to reaching the creek.

As described for Alternative 2, the chance of delivery of eroded soil material depends on a number of factors including slope, presence or absence of vegetated buffers or surface roughness factors and distance to adjacent streams. According to Table 3-39, portions of four activities would create disturbance within Riparian Reserves in Alternative 3. These activities include the right- and left-turn lanes, a small portion of the access road to the Twilight Parking Lot, the utility line to the Twilight Parking Lot, and the new Sunrise Vehicle Maintenance Shop. A total of 4.8 acres of disturbance would occur within Riparian Reserves.

Figure 3-14: Map of the Alternative 3 Maintenance Shop Location (Photo showing the location of the Alternative 3 Maintenance Shop and adjacent wetland. Riparian Reserves are shown in green. This shop location would increase the overall amount of snow needing treatment and cause more snow to be stored over Mitchell Creek.)



Further assessement of site factors that influence the risk of sediment delivery to surface water is included in the table below. This table displays the closest distance an activity is from surface water, whether there is an intact vegetative buffer between the activity and surface water and provides a qualitative rating of that activities connectivity to surface water.

Table 3-39: Qualitative Assessment of Connectivity to Surface Water For Disturbance in Riparian Reserves for Alternative 3

Activity in Riparian Reserve	Distance to Surface Water	Intact Buffer?	Connectivity to Surface Water
Right- and Left-Turn Lane	10 feet	No	High
Twilight Parking Lot with associated access road and bus shop	225 feet	Mostly Intact Except for Forest Service Road 3545	Low
Utility Line - Twilight	75 feet	Yes	Low
Maintenance Shop	25 feet	Limited shrubs and willows	High

Chemical Contaminants: For a complete discussion of potential direct and indirect effects of chemical contaminants on the aquatic environment, please refer to the Fisheries and Aquatic Fauna Specialist Report located in the project record. To summarize that section, the highest risk of introduction of chemical contaminates to aquatic resources is at the new Sunrise Vehicle Maintenance Shop. Although a stormwater management system would be incorporated into the maintenance shop it is unclear whether it could route all runoff, including pollutants, completely away from the Mitchell Creek tributary. The risk of chemicals reaching the creek is higher in this location than the maintenance shop location proposed in Alternative 2. The increased risk is due to proximity to the creek and the smaller size of the stormwater management system compared to Alternative 2.

Flow/Hydrology

Peak Flow/Vegetation: Alternative 3 would increase the watershed impact area from 6.4 percent to 7.3 percent in the Permit Area. This is still well below the Forest Plan Standard maximum of 35 percent so no detrimental effects due to peak flow increase from vegetation removal are anticipated.

Peak Flow/Impervious Surfaces: Detrimental effects to aquatic resources from impervious surfaces for Alternative 3 would be similar to those described for Alternative 2. Implementation of Alternative 3 would increase the impervious surfaces to 4.0 percent in Meadows Creek and maintain 1.3 percent in Headwaters East Fork Hood River sub-watershed. These values are still well below the threshold of 10 percent identified in literature as potentially starting to degrade the aquatic environment.

Groundwater: As described in the Impervious Surface section of this report, the parking lot and maintenance shed would utilize EPA technical guidance outlined in EPA 841-B-09-001 for design of stormwater facilities where site conditions allow. The purpose of this guidance is to employ treatment systems that mimic natural processes including infiltration and recharge of groundwater systems. Utilizing this design guidance would ensure pre-development hydrology including groundwater recharge are maintained.

Wetlands: Construction of the right-turn lane would fill in a small, linear wetland that has developed in the ditchline on the north side of Highway 35. Effects would be the same as those described in Alternative 2.

Summary of Indirect/Direct Effects

Most detrimental effects to water quality would be reduced or eliminated through implementation of PDC and BMP in Alternative 3. The only projects that may have some risk of direct/indirect detrimental effects to water quality are the left-turn lane on Highway 35 and the new Sunrise Vehicle Maintenance Shop. These projects may result in some indirect introduction of sediment and chemical contaminants which would be limited in scope due to PDC and BMP. In addition, construction of the right-turn lane would fill in an existing wetland in the road ditchline, but the feature would be reconstructed in the new ditchline as part of the design. The overall relative risk of detrimental indirect/direct effects to water quality for Alternative 3 is greater than Alternative 2 due to the maintenance shop location. The table below is a summary of the changes to water quality indicators between Alternative 1 and 3.

Table 3-40: Summary of water quality indicators for Alternative 3.

Water Quality Effects Measure	Alternative 3	Change from Alternative 1	Applicable Threshold of Concern
Percent of Sub-watershed in Impervious Surfaces	4.0% in Meadows Creek; 1.3% in Headwaters East Fork Hood River	Increased by 1.0% in Meadows Creek; Increased by 0.1% in Headwaters East Fork Hood River	Concern if Total Impervious Surface Greater than 10%
Acres of Disturbance in Riparian Reserve	4.8 Acres	Increased by 4.8 Acres	No Threshold

Cumulative Effects

Water quality cumulative effects for Alternative 3 would be similar to those described for Alternative 2. The only difference is shown in the table below and relates to water quality effects associated with the new Sunrise Vehicle Maintenance Shop.

Table 3-41: Cumulative Effects for Water Quality

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?
		Time	Space		
Sunrise Parking Lot Use and Maintenance, including snow removal	Stream Temperature	Yes	No	No	Shade producing trees were removed along approximately 300' of Mitchell Creek when the Sunrise Parking Lot was constructed. Although some increase in water temperature is expected in the Mitchell Creek tributary due to tree removal associated with the proposed new maintenance shop, it would not affect Mitchell Creek since the tributary stream goes subsurface prior to joining Mitchell Creek
	Suspended and Bedload Sediment	Yes	No	No	There would be an overlap in timing of effects with this project and the Mt. Hood Meadows Parking Lot Improvement Project. Since the new Sunrise Vehicle Maintenance Shop would be located on an unconnected tributary to Mitchell Creek, sediment associated with vehicle traction and snow management at the new shop would likely not mix with other sediment in Mitchell Creek downstream.
	Chemical Contaminants	Yes	No	No	There would be an overlap in timing of effects with this project and the Mt. Hood Meadows Parking Lot Improvement Project. Since the new Sunrise Vehicle Maintenance Shop would be located on an unconnected tributary to Mitchell Creek, any chemical contaminants associated with runoff from the new shop would likely not mix with anything in Mitchell Creek downstream. As discussed in the effects section, the total amount of contaminants would be very low due to implementation of PDC and conformance with existing standards and guidelines in both projects.
	Water Quantity	Yes	Yes	No	There would be an overlap in timing of increased runoff from impervious surfaces from this project and the Mt. Hood Meadows Parking Lot Improvement Project. The highest potential is the new Sunrise Vehicle Maintenance Shop located on an unnamed tributary of Mitchell Creek upstream of the existing Sunrise Parking Lot. The potential cumulative effect would be minimized due to implementation of PDC that include stormwater treatment and conformance with existing standards and guidelines in both projects.
MHM Administrative Building Operation and Maintenance	Suspended and Bedload Sediment	Yes	Yes	No	Removal of snow from the Administration building plus runoff from the Sunrise Vehicle Maintenance Shop could result in some additional sediment routed into the unnamed tributary to Mitchell Creek. Amount would be immeasurable because the majority of snow at the Administration building is plowed towards the parking lot to the north, away from the unnamed tributary.
	Chemical Contaminants	Yes	Yes	Yes	Anticipated that some existing use, including vehicle maintenance, would continue at Administration building which would be adjacent to new vehicle maintenance shop in Alternative 3. This use increases risk of additional petrochemicals entering wetland and possibly stream.

Summary for Cumulative Effects

As stated above, the following summary only pertains to the new maintenance shop. Other cumulative effects are the same as described for Alternative 2.

Stream Temperature: No detrimental cumulative effects are expected as a result of increased water temperature due to the discontinuity of the unnamed tributary and Mitchell Creek. The rest of the activities in this alternative would maintain the existing primary shade zones and ultimately water temperatures.

Sediment: No detrimental cumulative effects are expected as a result of increased sediment due to the discontinuity of the unnamed tributary and Mitchell Creek. As described in the direct and indirect effects section, PDC aimed at minimizing erosion and sedimentation reduce the potential of erosion and delivery of the material to adjacent surface water.

Chemical Contaminants: Some minor detrimental cumulative effects are expected as a result of chemical contaminants from the Administration building mixing with stormwater from the new maintenance facility. The amount is expected to be small due to PDC minimizing the amount of chemical contaminates onsite and routing stormwater runoff through treatment facilities.

Water Quantity: A peak flow analysis was completed for this project and is displayed in the Effects Section above. This project along with other projects on and off National Forest lands were included in the Watershed Impact Area calculation (Forest Plan Standard FW-067, pg. Four-55) and the sub-basins were found to be in compliance with Forest Plan Standard FW-064 so no cumulative effects are anticipated for water quantity. In addition, total impervious surface values for the sub-watersheds were below thresholds of concern identified in literature.

Alternative 4

Water Quality

Stream Temperature: Effects to stream temperature for Alternative 4 would be similar to those described for Alternative 2. The maintenance shop in Alternative 4 is moved upslope from the Alternative 2 location, but the southwestern edge slightly impinges on the Riparian Reserve of a small wetland. The primary shade zone is maintained in all the activities in the alternative so no change in existing stream temperatures is anticipated.

Sediment: Direct and indirect effects from sediment for Alternative 4 would be similar to those described for Alternative 2, except for sediment concerns associated with traction gravel and snow management. Concerns over sediment introduction to surface water from traction gravel application and snow removal activites at the Sunrise maintenace shop in Alternative 4 have been eliminated. The location of the new shop is far away from Mitchell Creek (over 500-feet) and the East Fork Hood River (300-feet) so PDC and BMP that include treatment of stormwater would effectively keep all this material out of surface water.

As described for Alternative 2, the chance of delivery of eroded soil material depends on a number of factors including slope, presence or absence of vegetated buffers or surface roughness factors and distance to adjacent streams. According to Table 3-42, portions of five activities would create disturbance within Riparian Reserves in Alternative 4. These activities include the right-

and left-turn lanes, a small portion of the access road to the Twilight Parking Lot, the utility line to the Twilight Parking Lot, a small portion of the new Sunrise Vehicle Maintenance Shop and a portion of a new nordic ski trail. A total of 4.2 acres of disturbance would occur within Riparian Reserves.

Further assessement of site factors that influence the risk of sediment delivery to surface water is included in the table below. This table displays the closest distance an activity is from surface water, whether there is an intact vegetative buffer between the activity and surface water and provides a qualitative rating of that activities connectivity to surface water.

Table 3-42: Qualitative Assessment of Connectivity to Surface Water For Disturbance in Riparian Reserves for Alternative 4

Activity in Riparian Reserve	Distance to Surface Water	Intact Buffer?	Connectivity to Surface Water
Right- and Left-Turn Lanes	10 feet	No	High
Twilight Parking Lot with associated access road	200 feet	Mostly Intact Except for Forest Service Road 3545	Low
Utility Line - Twilight	75 feet	Yes	Low
Maintenance Shop	300 feet	Mostly Intact Except for 3555 Road	Low
Nordic Ski Trail	75 feet	Yes	Low

Chemical Contaminants: For a complete discussion of potential direct and indirect effects of chemical contaminants on the aquatic environment, please refer to the Fisheries and Aquatic Fauna Specialist Report located in the project record. To summarize that section, moving the maintenance shed to the Alternative 4 location would eliminate concerns over introduction of chemical contaminants into surface water. The rest of the activities would have similar effects to Alternative 2.

Flow/Hydrology

Peak Flow/Vegetation: Alternative 4 would increase the watershed impact area from 6.4 percent to 7.0 percent in the Permit Area. This is still well below the Forest Plan Standard maximum of 35 percent so no detrimental effects due to peak flow increase from vegetation removal are anticipated.

Peak Flow/Impervious Surfaces: Detrimental effects to aquatic resources from impervious surfaces for Alternative 4 would be similar to those described for Alternative 2. Implementation of Alternative 4 would increase the impervious surfaces to 3.5 percent in Meadows Creek and maintain 1.3 percent in Headwaters East Fork Hood River sub-watershed. These values are still well below the threshold of 10 percent identified in literature as potentially starting to degrade the aquatic environment.

Groundwater: As described in the Impervious Surface section of this report, the parking lot and maintenance shed would utilize EPA technical guidance outlined in EPA 841-B-09-001 for design of stormwater facilities where site conditions allow. The purpose of this guidance is to

employ treatment systems that mimic natural processes including infiltration and recharge of groundwater systems. Utilizing this design guidance would ensure pre-development hydrology including groundwater recharge are maintained.

Wetlands: Construction of the right-turn lane would fill in a small, linear wetland that has developed in the ditchline on the north side of Highway 35. Effects would be the same as those described in Alternative 2.

Summary of Indirect/Direct Effects

Most detrimental effects to water quality would be reduced or eliminated through implementation of PDC and BMP in Alternative 4. The only project that may have some risk of direct/indirect detrimental effects to water quality is the left-turn lane on Highway 35. This activity may result in some indirect introduction of sediment which would be limited in scope due to PDC and BMP. In addition, construction of the right-turn lane would fill in an existing wetland in the road ditchline, but the feature would be reconstructed in the new ditchline as part of the design. The overall relative risk of detrimental indirect/direct effects to water quality for Alternative 4 is the lowest compared to Alternatives 2 and 3. The table below is a summary of the changes to water quality indicators between Alternative 1 and 4.

Table 3-43: Summary of water quality indicators for Alternative 4.

Water Quality Effects Measure	Alternative 4	Change from Alternative 1	Applicable Threshold of Concern
Percent of Sub-watershed in Impervious Surfaces	3.5% in Meadows Creek; 1.3% in Headwaters East Fork Hood River	Increased by 0.5% in Meadows Creek; Increased by 0.1% in Headwaters East Fork Hood River	Concern if Total Impervious Surface Greater than 10%
Acres of Disturbance in Riparian Reserve	4.2 Acres	Increased by 4.2 Acres	No Threshold

Cumulative Effects

Water quality cumulative effects for Alternative 4 would be similar to those described for Alternative 2. The only difference is shown in the table below and relates to water quality effects associated with the new Sunrise Vehicle Maintenance Shop.

Table 3-44: Cumulative Effects for Water Quality

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?
		Time	Space		
Sunrise and Hood River Meadows Parking Lots	Stream Temperature	Yes	Yes	No	Mt. Hood Meadows Parking Lot Improvement Project would maintain the primary shade zone so there should be no increase in stream temperature.
	Suspended and Bedload Sediment	Yes	Yes	No	There may be an overlap in timing of this project with the Mt. Hood Meadows Parking Lot Improvement Project; any minor suspended sediment would not be measurable due to implementation of PDC and conformance with existing standards and guidelines in both projects.
	Chemical Contaminants	Yes	Yes	No	There may be an overlap in timing of this project with the Mt. Hood Meadows Parking Lot Improvement Project; any minor chemical contaminants would not be measurable due to implementation of PDC and conformance with existing standards and guidelines in both projects.
	Water Quantity	Yes	Yes	No	There would be an overlap in timing of effects with this project and the Mt. Hood Meadows Parking Lot Improvement Project. The potential cumulative effect would be minimized due to implementation of PDC and conformance with existing standards and guidelines in both projects.

Summary for Cumulative Effects

As stated above, the following summary only pertains to the new maintenance shop. Other cumulative effects are the same as described for Alternative 2.

Stream Temperature: No detrimental cumulative effects are expected as a result of increased water temperature due to PDC that maintain existing primary shade vegetation adjacent to streams.

Sediment: No detrimental cumulative effects are expected as a result of increased sediment due to the location of the new shop away from adjacent streams. As described in the direct and indirect effects section, PDC aimed at minimizing erosion and sedimentation reduce the potential of erosion and delivery of the material to adjacent surface water.

Chemical Contaminants: No detrimental cumulative effects are expected as a result of chemical contaminants due to the location of the new shop away from adjacent streams. Additionally, any chemical contaminates would be minimized due to PDC minimizing the amount of chemical contaminates onsite and routing stormwater runoff through treatment facilities.

Water Quantity: A peak flow analysis was completed for this project and is displayed in the Effects Section above. This project along with other projects on and off National Forest lands were included in the Watershed Impact Area calculation (Forest Plan Standard FW-067, pg. Four-55)

and the sub-basins were found to be in compliance with Forest Plan Standard FW-064 so no cumulative effects are anticipated for water quantity. In addition, total impervious surface values for the sub-watersheds were below thresholds of concern identified in literature.

Alternative 5

Water Quality

Stream Temperature: The general location of the Twilight lot and associated facilities in Alternative 5 is the same as Alternative 4, but the footprint increases by 3.3 acres. The new configuration actually reduces the amount of Riparian Reserve disturbance by 0.1 acres for the new parking lot compared to Alternative 4. All of the rest of the proposed activities are the same as Alternative 4. The primary shade zone is maintained in all the activities in the alternative so no change in existing stream temperature is anticipated.

Sediment: Direct and indirect effects from sediment for Alternative 5 would be similar to those described for Alternative 2, except for sediment concerns associated with traction gravel and snow management. Concerns over sediment introduction to surface water from traction gravel application and snow removal activites at the Sunrise maintenace shop in Alternative 5 have been eliminated. The location of the new shop is far away from Mitchell Creek (over 500-feet) and the East Fork Hood River (300-feet) so PDC and BMP that include treatment of stormwater would effectively keep all this material out of surface water.

As described for Alternative 2, the chance of delivery of eroded soil material depends on a number of factors including slope, presence or absence of vegetated buffers or surface roughness factors and distance to adjacent streams. According to Table 3-45, portions of five activities would create disturbance within Riparian Reserves in Alternative 4. These activities include the right- and left-turn lanes, a small portion of the access road to the Twilight Parking Lot with associated access road and bus shop, the utility line to the Twilight Parking Lot, a small portion of the new Sunrise Vehicle Maintenance Shop and a portion of a new nordic ski trail. A total of 4.2 acres of disturbance would occur within Riparian Reserves.

Further assessement of site factors that influence the risk of sediment delivery to surface water is included in the table below. This table displays the closest distance an activity is from surface water, whether there is an intact vegetative buffer between the activity and surface water and provides a qualitative rating of that activities connectivity to surface water.

Table 3-45: Qualitative Assessment of Connectivity to Surface Water For Disturbance in Riparian Reserves for Alternative 5

Activity in Riparian Reserve	Distance to Surface Water	Intact Buffer?	Connectivity to Surface Water
Right- and Left-Turn Lanes	10 feet	No	High
Twilight Parking Lot with associated access road and bus shop	200 feet	Mostly Intact Except for Forest Service Road 3545	Low
Utility Line - Twilight	75 feet	Yes	Low
Maintenance Shop	300 feet	Mostly Intact Except for 3555 Road	Low
Nordic Ski Trail	75 feet	Yes	Low

Chemical Contaminants: For a complete discussion of potential direct and indirect effects of chemical contaminants on the aquatic environment, please refer to the Fisheries and Aquatic Fauna Specialist Report located in the project record. To summarize that section, moving the maintenance shed to the Alternative 5 location would eliminate concerns over introduction of chemical contaminants into surface water. The rest of the activities would have similar effects to Alternative 2.

Flow/Hydrology

Peak Flow/Vegetation: Alternative 5 would increase the watershed impact area from 6.4 percent to 7.1 percent in the Permit Area. This is still well below the Forest Plan Standard maximum of 35 percent so no detrimental effects due to peak flow increase from vegetation removal are anticipated.

Peak Flow/Impervious Surfaces: Detrimental effects to aquatic resources from impervious surfaces for Alternative 5 would be similar to those described for Alternative 2. Implementation of Alternative 5 would increase the impervious surfaces to 3.9 percent in Meadows Creek and maintain 1.3 percent in Headwaters East Fork Hood River sub-watershed. These values are still well below the threshold of 10 percent identified in literature as potentially starting to degrade the aquatic environment.

Groundwater: As described in the Impervious Surface section of this report, the parking lot and maintenance shed would utilize EPA technical guidance outlined in EPA 841-B-09-001 for design of stormwater facilities where site conditions allow. The purpose of this guidance is to employ treatment systems that mimic natural processes including infiltration and recharge of groundwater systems. Utilizing this design guidance would ensure pre-development hydrology including groundwater recharge are maintained.

Wetlands: Construction of the right-turn lane would fill in a small, linear wetland that has developed in the ditchline on the north side of Highway 35. Effects would be the same as those described in Alternative 2.

Summary of Indirect/Direct Effects

Most detrimental effects to water quality would be reduced or eliminated through implementation of PDC and BMP in Alternative 5. The only project that may have some risk of direct/indirect detrimental effects to water quality is the left-turn lane on Highway 35. This activity may result in some indirect introduction of sediment which would be limited in scope due to PDC and BMP. In addition, construction of the right-turn lane would fill in an existing wetland in the road ditchline, but the feature would be reconstructed in the new ditchline as part of the design. The overall relative risk of detrimental indirect/direct effects to water quality for Alternative 5 is essentially equivalent to Alternative 4. The table below is a summary of the changes to water quality indicators between Alternative 1 and 5.

Table 3-46: Summary of water quality indicators for Alternative 5.

Water Quality Effects Measure	Alternative 5	Change from Alternative 1	Applicable Threshold of Concern
Percent of Sub-watershed in Impervious Surfaces	3.9% in Meadows Creek; 1.3% in Headwaters East Fork Hood River	Increased by 0.9% in Meadows Creek; Increased by 0.1% in Headwaters East Fork Hood River	Concern if Total Impervious Surface Greater than 10%
Acres of Disturbance in Riparian Reserve	4.2 Acres	Increased by 4.2 Acres	No Threshold

Cumulative Effects

Water quality cumulative effects for Alternative 5 would be similar to those described for Alternative 2 and 4. The only difference is shown in the table below and relates to water quality effects associated with the new Sunrise Vehicle Maintenance Shop.

Table 3-47: Cumulative Effects for Water Quality

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?
		Time	Space		
Sunrise and Hood River Meadows Parking Lots	Stream Temperature	Yes	Yes	No	Mt. Hood Meadows Parking Lot Improvement Project would maintain the primary shade zone so there should be no increase in stream temperature.
	Suspended and Bedload Sediment	Yes	Yes	No	There may be an overlap in timing of this project with the Mt. Hood Meadows Parking Lot Improvement Project; any minor suspended sediment would not be measurable due to implementation of PDC and conformance with existing standards and guidelines in both projects.
	Chemical Contaminants	Yes	Yes	No	There may be an overlap in timing of this project with the Mt. Hood Meadows Parking Lot Improvement Project; any minor chemical contaminants would not be measurable due to implementation of PDC and conformance with existing standards and guidelines in both projects.
	Water Quantity	Yes	Yes	No	There would be an overlap in timing of effects with this project and the Mt. Hood Meadows Parking Lot Improvement Project. The potential cumulative effect would be minimized due to implementation of PDC and conformance with existing standards and guidelines in both projects.

Summary for Cumulative Effects

As stated above, the following summary only pertains to the new maintenance shop. Other cumulative effects are the same as described for Alternative 2.

Stream Temperature: No detrimental cumulative effects are expected as a result of increased water temperature due to PDC that maintain existing primary shade vegetation adjacent to streams.

Sediment: No detrimental cumulative effects are expected as a result of increased sediment due to the location of the new shop away from adjacent streams. As described in the direct and indirect effects section, PDC aimed at minimizing erosion and sedimentation reduce the potential of erosion and delivery of the material to adjacent surface water.

Chemical Contaminants: No detrimental cumulative effects are expected as a result of chemical contaminants due to the location of the new shop away from adjacent streams. Additionally, any chemical contaminates would be minimized due to PDC minimizing the amount of chemical contaminates onsite and routing stormwater runoff through treatment facilities.

Water Quantity: A peak flow analysis was completed for this project and is displayed in the Effects Section above. This project along with other projects on and off National Forest lands were included in the Watershed Impact Area calculation (Forest Plan Standard FW-067, pg. Four-55)

and the sub-basins were found to be in compliance with Forest Plan Standard FW-064 so no cumulative effects are anticipated for water quantity. In addition, total impervious surface values for the sub-watersheds were below thresholds of concern identified in literature.

Alternative 6

Water Quality

Stream Temperature: Effects to stream temperature for Alternative 6 would be similar to those described for Alternative 2. The maintenance shop in Alternative 6 is moved upslope from the Alternative 2 location, but the southwestern edge slightly impinges on the Riparian Reserve of a small wetland. The primary shade zone is maintained in all the activities in the alternative, so no change in existing stream temperatures is anticipated.

Sediment: Direct and indirect effects from sediment for Alternative 6 would be similar to those described for Alternative 2, except for sediment concerns associated with traction gravel and snow management. Concerns over sediment introduction to surface water from traction gravel application and snow removal activites at the Sunrise maintenace shop in Alternative 6 have been eliminated. The location of the new shop is far away from Mitchell Creek (over 500-feet) and the East Fork Hood River (300-feet) so PDC and BMP that include treatment of stormwater would effectively keep all this material out of surface water.

As described for Alternative 2, the chance of delivery of eroded soil material depends on a number of factors including slope, presence or absence of vegetated buffers or surface roughness factors and distance to adjacent streams. According to Table 3-48, portions of four activities would create disturbance within Riparian Reserves in Alternative 6. These activities include the right- and left-turn lanes, a small portion of the access road to the Twilight Parking Lot, the utility line to the Twilight Parking Lot and a small portion of the new Sunrise Vehicle Maintenance Shop. A total of 3.8 acres of disturbance would occur within Riparian Reserves.

Further assessement of site factors that influence the risk of sediment delivery to surface water is included in the table below. This table displays the closest distance an activity is from surface water, whether there is an intact vegetative buffer between the activity and surface water and provides a qualitative rating of that activities connectivity to surface water.

Table 3-48: Qualitative Assessment of Connectivity to Surface Water For Disturbance in Riparian Reserves for Alternative 6

Activity in Riparian Reserve	Distance to Surface Water	Intact Buffer?	Connectivity to Surface Water
Right- and Left-Turn Lanes	10 feet	No	High
Twilight Parking Lot with associated access road	225 feet	Mostly Intact Except for Forest Service Road 3545	Low
Utility Line - Twilight	75 feet	Yes	Low
Maintenance Shop	300 feet	Mostly Intact Except for 3555 Road	Low

Chemical Contaminants: For a complete discussion of potential direct and indirect effects of chemical contaminants on the aquatic environment, please refer to the Fisheries and Aquatic Fauna Specialist Report located in the project record. To summarize that section, moving the maintenance shed to the Alternative 6 location would eliminate concerns over introduction of chemical contaminants into surface water. The rest of the activities would have similar effects to Alternative 2.

Flow/Hydrology

Peak Flow/Vegetation: Alternative 6 would increase the watershed impact area from 6.4 percent to 7.0 percent in the Permit Area. This is still well below the Forest Plan Standard maximum of 35 percent, so no detrimental effects due to peak flow increase from vegetation removal are anticipated.

Peak Flow/Impervious Surfaces: Detrimental effects to aquatic resources from impervious surfaces for Alternative 6 would be similar to those described for Alternative 2. Implementation of Alternative 6 would increase the impervious surfaces to 4.0 percent in Meadows Creek and maintain 1.3 percent in Headwaters East Fork Hood River sub-watershed. These values are still well below the threshold of 10 percent identified in literature as potentially starting to degrade the aquatic environment.

Groundwater: As described in the Impervious Surface section, the parking lot and maintenance shed would utilize EPA technical guidance outlined in EPA 841-B-09-001 for design of stormwater facilities where site conditions allow. The purpose of this guidance is to employ treatment systems that mimic natural processes including infiltration and recharge of groundwater systems. Utilizing this design guidance would ensure pre-development hydrology including groundwater recharge are maintained.

Wetlands: Construction of the right-turn lane would fill in a small, linear wetland that has developed in the ditchline on the north side of Highway 35. Effects would be the same as those described in Alternative 2.

Summary of Indirect/Direct Effects

Most detrimental effects to water quality would be reduced or eliminated through implementation of PDC and BMP in Alternative 6. The only project that may have some risk of direct/indirect detrimental effects to water quality is the left-turn lane on Highway 35. This activity may result in some indirect introduction of sediment which would be limited in scope due to PDC and BMP. In addition, construction of the right-turn lane would fill in an existing wetland in the road ditchline, but the feature would be reconstructed in the new ditchline as part of the design. The overall relative risk of detrimental indirect/direct effects to water quality for Alternative 6 is essentially equivalent to Alternatives 4 and 5. The table below is a summary of the changes to water quality indicators between Alternative 1 and 6.

Table 3-49: Summary of water quality indicators for Alternative 6.

Water Quality Effects Measure	Alternative 4	Change from Alternative 1	Applicable Threshold of Concern
Percent of Sub-watershed in Impervious Surfaces	4.0% in Meadows Creek; 1.3% in Headwaters East Fork Hood River	Increased by 1.0% in Meadows Creek; Increased by 0.1% in Headwaters East Fork Hood River	Concern if Total Impervious Surface Greater than 10%
Acres of Disturbance in Riparian Reserve	3.8 Acres	Increased by 3.8 Acres	No Threshold

Cumulative Effects

Water quality cumulative effects for Alternative 6 would be similar to those described for Alternative 2. The only difference is shown in the table below and relates to water quality effects associated with the new Sunrise Vehicle Maintenance Shop.

Table 3-50: Cumulative Effects for Water Quality

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?
		Time	Space		
Sunrise and Hood River Meadows Parking Lots	Stream Temperature	Yes	Yes	No	Mt. Hood Meadows Parking Lot Improvement Project would maintain the primary shade zone so there should be no increase in stream temperature.
	Suspended and Bedload Sediment	Yes	Yes	No	There may be an overlap in timing of this project with the Mt. Hood Meadows Parking Lot Improvement Project; any minor suspended sediment would not be measurable due to implementation of PDC and conformance with existing standards and guidelines in both projects.
	Chemical Contaminants	Yes	Yes	No	There may be an overlap in timing of this project with the Mt. Hood Meadows Parking Lot Improvement Project; any minor chemical contaminants would not be measurable due to implementation of PDC and conformance with existing standards and guidelines in both projects.
	Water Quantity	Yes	Yes	No	There would be an overlap in timing of effects with this project and the Mt. Hood Meadows Parking Lot Improvement Project. The potential cumulative effect would be minimized due to implementation of PDC and conformance with existing standards and guidelines in both projects

Summary for Cumulative Effects

As stated above, the following summary only pertains to the new maintenance shop. Other cumulative effects are the same as described for Alternative 2.

Stream Temperature: No detrimental cumulative effects are expected as a result of increased water temperature due to PDC that maintain existing primary shade vegetation adjacent to streams.

Sediment: No detrimental cumulative effects are expected as a result of increased sediment due to the location of the new shop away from adjacent streams. As described in the direct and indirect effects section, PDC aimed at minimizing erosion and sedimentation reduce the potential of erosion and delivery of the material to adjacent surface water.

Chemical Contaminants: No detrimental cumulative effects are expected as a result of chemical contaminants due to the location of the new shop away from adjacent streams. Additionally, any chemical contaminates would be minimized due to PDC minimizing the amount of chemical contaminates onsite and routing stormwater runoff through treatment facilities.

Water Quantity: A peak flow analysis was completed for this project and is displayed in the Effects Section above. This project along with other projects on and off National Forest lands were included in the Watershed Impact Area calculation (Forest Plan Standard FW-067, pg. Four-55) and the sub-basins were found to be in compliance with Forest Plan Standard FW-064 so no cumulative effects are anticipated for water quantity. In addition, total impervious surface values for the sub-watersheds were below thresholds of concern identified in literature.

3.4.4 Consistency Determination

Numerous existing plans provide guidance for projects in the form of Standards and Guidelines (S&G) and recommended Best Management Practices (BMP). These documents include the Mt. Hood National Forest Land and Resource Plan (Forest Plan), the Northwest Forest Plan (NWFP) and associated supporting documents, Mt. Hood Meadows Ski Area Master Plan and the West Hood Subbasin TMDL. A summary of applicable water quality S&G and BMP's from these documents are displayed below.

Forest Plan Standards and Guidelines (pages Four-53 through 63)

- Standards and Guidelines dealing with Air Quality – FW-40,41,42,43,44,45,46,47
- Standards and Guidelines dealing with BMPs – FW-54,55,56,57,58,59,60
- Standards and Guidelines dealing with analysis considerations – FW-61,62,63,64,65,66,67
- Standards and Guidelines dealing with maintaining good water quality (temperature and sediment) - FW-109,110,111,112,113,114,127,128,129,132,133,134,135,136

Northwest Forest Plan (NWFP) Standards and Guidelines:

- Standards and Guidelines dealing with Recreation Management (NWFP ROD pg. C-34), RM-1
- Standards and Guidelines dealing with Riparian Reserves (NWFP ROD, pg. C-31 through C-38). The primary Standards and Guidelines that pertain to this project are Recreation Management – RM-2.
- Aquatic Conservation Strategy

The Clean Water Act of 1948 (as amended in 1972 and 1987) establishes as federal policy the control of point and non-point pollution and assigns the States the primary responsibility for control of water pollution. Compliance with the Clean Water Act by National Forests in Oregon is achieved under State Law.

West Hood Subbasin TMDL: Continue to follow Mt. Hood LRMP and Northwest Forest Plan Standards and Guidelines as well as the *Northwest Forest Plan (NWFP) Temperature TMDL Implementation Strategies: Evaluation of the Northwest Forest Plan Aquatic Conservation Strategy (ACS) and Associated Tools* (2005).

In addition to the plans discussed above other documents such as the draft "Forest Service National Core Best Management Practices" (USDAFS, 2012) provide guidance about potential BMP's for this project. Those BMP's would be incorporated where appropriate.

As outlined in the effects section this project is consistent with applicable law and direction stated above. Major highlights include:

- The inclusion of Best Management Practices (BMP) to meet water quality standards and the Clean Water Act. These BMPs reduce or eliminate potential degradation from increased water temperature and sedimentation;
- Establishment of Riparian Reserves; and,
- Designing prescriptions within Riparian Reserves to contribute to attainment of Aquatic Conservation Strategy Objectives (see the Aquatic Conservation Strategy section for more information).

<u>Executive Order 11990 – Protection of wetlands</u>
As documented above, construction of the right-turn lane off of Highway 35 would fill in a small (0.01 acre) wetland. The wetland appears to have been formed partially by interception of groundwater by construction of the ditchline and snowmelt runoff from the forested area to the north. This wetland would be reconstructed in the ditchline adjacent to the new right-turn lane approximately 10 feet to the north of the existing wetland. It is expected that the hydrology that formed the existing wetland would be present in the new location since it is so close and no conditions were observed that might interrupt flow between the two areas. This would result in not net loss of wetlands. In addition, wetland mapping efforts have been completed by consultants hired by Mt. Hood Meadows as well as Forest Service specialists that did field work for this project. All of the Alternatives do propose construction of the right-turn land and some level of entry into Riparian Reserves adjacent to wetlands. This is due to site limitations, and the incursions were avoided where possible. As outlined in the Water Quality section, PDC and BMP aimed at reducing or eliminating potential detrimental effects to water quality are included with this project. Even with PDC and BMP, there is some risk of degradation to water quality in a wetland adjacent to the Sunrise Vehicle Maintenance Shop in Alternative 3. This would likely be observed at the site level.

<u>Executive Order 11988 – Protection of floodplains</u>
Due to the steepness of the topography, small stream size and confined nature of streams in this area, floodplain width is fairly limited. The 100-year floodplain on all first order tributaries is estimated to be less than 15' feet wide in general. On East Fork Hood River, the 100-year floodplain is estimated to be generally less than 30 feet wide, while Meadows and Mitchell Creek are about 20 feet wide. The only work proposed to occur in a floodplain area is the left-turn lane that crosses Meadows Creek. As stated in the Water Quality section, most of this project would be located in a footprint that has already been disturbed and this project includes numerous BMP and PDC aimed at reducing degradation to physical stream channel characteristics. In addition, a new culvert would be installed prior to construction of the left-turn lane that is larger in diameter and would allow more natural stream and floodplain processes to occur.

3.4.5 Summary of Effects by Alternative

All action alternatives would have some disturbance in the Riparian Reserves. Disturbance in the Riparian Reserves associated with the new Sunrise Vehicle Maintenance Shop in Alternative 3 has some risk of increasing water temperature, sediment and chemical contaminants due to the close proximity to a wetland/stream and complete removal of approximately 400 linear feet of riparian vegetation. Alternative 2 has risk of increased sedimentation due to snow removal limitations in the Sunrise Parking Lot footprint posed by the new Sunrise Vehicle Maintenance Shop. All of the above effects are anticipated to be localized and most likely only noticeable at the site scale. While all action alternatives propose to increase impervious surfaces, the total is still below levels of concern.

Alternatives 4, 5 and 6 have the lowest relative risk for detrimental effects to the aquatic environment of all the action alternatives.

3.4.6 Incomplete and Unavailable Information

Incomplete information includes additional hydrocarbon monitoring on the Main parking lot. As stated in the Affected Environment section, monitoring of runoff in the Main parking lot occurred prior to installation of the stormwater management system. This additional monitoring would give some indication of the effectiveness of stormwater treatment.

Table 3-51: Summary of Effects by Alternative

Activity	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Riparian Reserve Disturbance (Acres)	3.7	4.8	4.2	4.2	3.8
Increase In Impervious Surface (Percent)	Meadows Creek +1.0%	Meadows Creek +1.0%	Meadows Creek +0.5%	Meadows Creek +0.9%	Meadows Creek +1.0%
	Headwaters E. Fk Hood +0.1%	Headwaters E. Fk Hood +0.1%	Headwaters E. Fk Hood +0.1%	Headwaters E. Fk Hood +0.1%	Headwaters E. Fk Hood +0.1%
Risk of Some Increased Water Temperature?	Low	Moderate – High (Limited to Site)	Low	Low	Low
Risk of Some Increased Sediment?	Moderate	Moderate (Limited to Site)	Low	Low	Low
Risk of Some Increased Chemical Contaminants?	Low	Moderate (Limited to Site)	Low	Low	Low

3.5. Aquatics

More information is available in the project record including the full fisheries analysis file, and biological evaluation as part of the Fisheries and Aquatic Fauna Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.5.1 Introduction

Forest management activities that may alter the aquatic habitat or affect individuals or populations of PETS (Proposed, Endangered, Threatened, and Sensitive) fish and aquatic species require a Biological Evaluation to be completed (FSM 267l.44 and FSM 2670.32) as part of the National Environmental Policy Act process and Endangered Species Act to determine their potential effects on sensitive, threatened or endangered species. The Biological Evaluation process (FSM 2672.43) is intended to conduct and document analyses necessary to ensure proposed management actions will not likely jeopardize the continued existence or cause adverse modification of habitat for:

A. Species listed or proposed to be listed as endangered (E) or threatened (T) by the USDI-Fish and Wildlife Service or USDC-NOAA Fisheries, and their listed or proposed listed critical habitat.

The Biological Evaluation process (FSM 2672.41) is also intended to conduct and document analyses to ensure that Forest Service actions do not contribute to loss of viability of any native or desired non-native plant or contribute to animal species or trends toward Federal listing of any species for:

B. Species listed as sensitive (S) by U.S. Forest Service Region 6.

This fisheries and aquatic invertebrate specialist report/Biological Evaluation addresses all alternatives presented in the Mt. Hood Meadows Parking Lot Improvements Environmental Impact Statement (hereafter referred to as the EIS).

3.5.2 Analysis Assumptions and Methodology

The analysis method utilized to determine potential impact to fish, aquatic invertebrates, and their associated habitat are listed below.

- Determine known and suspected locations of federally listed or proposed aquatic species, designated critical habitat, essential fish habitat, Region 6 Regional Forester's sensitive species, and Mt. Hood National Forest management indicator species in relation to proposed project activities.
- Assess proposed project activities (including post construction) and determine the aquatic habitat elements potentially impacted and the geographic area where effects could occur (i.e. the affected environment).
- Overlap the species/habitat locations with the affected environment and determine which species/habitat could be affected by project activities.

- When species/habitat overlaps with affected environment predict impacts from proposed project activities to individuals and their associated habitat. This analysis relies upon the Soil Productivity and Water Quality Specialist Reports to determine the potential effects to physical resources (i.e. habitat). These specialist reports are available in the project record located at the Hood River Ranger District in Mount Hood/Parkdale, Oregon.
- Potential effects to aquatic fauna and habitat were determined from the following:
  - ▹ Direct effects from construction activities;
  - ▹ Potential reductions in stream shade and subsequent increases in water temperature compared to existing levels;
  - ▹ Potential increases in erosion and fine sediment input to streams and wetlands compared to existing levels;
  - ▹ Water quality, in terms of potential pollutants (besides sediment and temperature), resulting from construction activities, expanded parking and new maintenance facilities; and,
  - ▹ Cumulative effects associated with ongoing or proposed projects in the affected environment.
- Where changes to habitat parameters discussed above result from proposed project activities, the potential impacts to aquatic species/habitat were analyzed and then the effects to the biological resource were determined based on professional experience, applicable surveys/studies, and available literature/research.

Assumptions associated with the methodology are listed below.

- Aquatic faunal and habitat survey data utilized is the latest available. It is assumed that this information is representative of current conditions unless otherwise noted below.
- All Best Management Practices (BMP) and Project Design Criteria (PDC) listed in EIS, Chapter 2 would be fully implemented and effective.
- The areas of impact outlined in EIS, Chapter 2 are the actual areas of disturbance. For example, acres identified for the Twilight Parking Lot (regardless of alternative) include all clearing, grading, etc. and are thus accurate representations of actual disturbance.
- Monitoring effectiveness of PDC and compliance would be a component of project implementation.
- A large chemical spill (gas, oil or other material) would not be considered in this analysis because it is not a planned activity.
- All surface water areas have been identified through field work.
- The left turn lane is located in a disturbed footprint associated with the Meadows Creek Fish Passage culvert. The fish passage culvert installation will occur at least 1 year prior to construction of the left turn lane.

3.5.3 Existing Condition

Existing Condition Overview

All of the MHM Permit Area (hereafter referred to as the Permit Area) is located within portions of three 7th field sub-watersheds: Headwaters East Fork Hood River, Meadows Creek and Clark Creek. Seventh field watersheds are small, generally several hundred to several thousand acres in size. All of the above mentioned 7th field sub-watersheds are located within the Upper East Fork Hood River 6th field watershed and the East Fork Hood River 5th field watershed.

There are many streams, springs and wetlands located within these sub-watersheds. The primary streams include the East Fork Hood River and three main tributaries to the headwaters of the East Fork: Mitchell Creek, Meadows Creek, and Clark Creek There are approximately 28 miles of stream in the Permit Area portion of these 7th field sub-watersheds in the following categories: 10 miles of perennial streams (flow year around) and 18 miles of intermittent streams (streams that dry up for part of the year). There are approximately 11 acres of mapped wetlands within the Permit Area boundary.

Drainage areas occupied by streams within the Permit Area are generally small (less than 3 square miles) and high in gradient (greater than 10% slope). Stream drainage patterns typically consist of a series of streams running in a southeast direction off the flanks of Mt. Hood. Stream courses are generally well-defined and typically shallowly incised. Streams in the area carry a heavy natural sediment load which originates mainly from one or more of the following: upper elevation glacial action, wind and surface erosion, and/or mass failures. This natural sediment load is a major influence on the character of these streams. In steep areas, the channels are typically cut to bedrock and the sides are steep and unstable. On flat reaches, the sediment is deposited and in some areas deltas and/or wetlands are formed. Water quality is generally good, with water temperatures well below Oregon Department of Environmental Quality standards. None of the streams in the Permit Area are listed in the Oregon 303d list of water quality impaired streams.

Proposed project locations within the Permit Area are located in all three 7th field watersheds. The Twilight Parking Lot, Nordic ski trails, Nordic Guest Service Building, left- and right-turn lanes, Twilight Equipment Maintenance Yard (bus shop), and Sahalie Falls trail relocation are all located within the Meadows Creek and Clark Creek 7th field watersheds. The Sunrise Vehicle Maintenance Shop and associated utility lines, regardless of the alternative, would be located wholly within the Headwaters East Fork Hood River 7th field watershed.

A 2011 analysis of watershed condition conducted at the 6th field level determined that overall physical aquatic habitat in the Upper East Fork Hood River 6th field subwatershed was given a classification rating of 1.4, which is between "Properly Functioning" and "Functioning at Risk". Watershed condition analysis was not conducted at a finer watershed scale.

Affected Environment/Action Area

The affected environment, also known as the action area, is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action [50 CFR §402.02]. For the purposes of this analysis, the affected environment is defined as all areas where ground disturbance would take place for all proposed projects, as well as aquatic habitat areas downstream where potential effects could occur. In this case the affected environment for the aquatic fauna and habitat analysis is as follows.

- Twilight Parking Lot (including Nordic guest services building): Affected environment is the ground disturbance area associated with the lot (regardless of alternative) and access road as described in Chapter 2. There are no anticipated impacts to Meadows or Clark Creek given proposed parking lot locations and PDC.
  - ▹ Rationale: Portions of the access road, and the parking lot itself in Alternative 2, lie within the 300 foot Riparian Reserve associated with Meadows Creek in all action alternatives (see Table 3-35). However, the Riparian Reserve overlap is outside the

true aquatic influence zone (riparian area directly adjacent to a stream) for Meadows Creek. In addition, Forest Service Road 3545 lies between the proposed lot locations and Meadows Creek, providing another buffer from potential overland water flow as water would be routed in the roadside ditch and there are no relief culverts leading to Meadows Creek.

- Twilight equipment maintenance yard: Affected environment is the ground disturbance area associated with the maintenance yard (regardless of alternative) and access road. There would be no impact to Meadows Creek given proposed maintenance yard locations and PDC.
  - ▹ Rationale: Same as Twilight parking above.

- Nordic trails: Affected environment is the identified ground disturbance area associated with the proposed ski trails (regardless of alternative). There would be no impact to either Meadows or Clark Creek given proposed Nordic trail locations and PDC.
  - ▹ Rationale: None of the new proposed Nordic trails lie within Riparian Reserves except for a small section of new trail in Alternative 5. This Riparian Reserve surrounds a small, isolated wetland located between Forest Service Road 3545 and the proposed Twilight Parking Lot. The wetland may have some hydrologic connection with Meadows Creek. However, the wetland does not have surface water year round, the expected ground disturbance is minimal in size, and PDC would ensure that erosion is minimized and any fine sediment would not reach Meadows Creek.

- Utility lines, Twilight Parking Lot: Ground disturbance area as outlined in Chapter 2.
  - ▹ Rationale: Regardless of the alternative the proposed utility lines would lie within a very small portion (0.03 acres) of the wetland described above for proposed Nordic trails in Alternative 5. Rationale the same as the Nordic trails.

- Sahalie Falls (FS Trail #667c) trail re-route: Ground disturbance area as outlined in Chapter 2.
  - ▹ Rationale: Proposed trail relocation would only lie within Riparian Reserves in Alternative 5. In this alternative the trail would be reconstructed essentially on top of the proposed utility line, at least within the Riparian Reserve. Rationale is the same as the Nordic trails.

- Left- and Right-Turn Lanes: Meadows Creek up to ½ mile downstream of the highway (left-turn lane only) and small wetland (right-turn lane only).
  - ▹ Rationale: This project is located within the Highway 35 road prism near where it crosses Meadows Creek and the left-turn lane lies within the Meadows Creek Riparian Reserve. Potential increases in sedimentation to Meadows Creek from turn lane construction are possible. Given the small size of the creek, naturally high amounts of fine sediment, and the fact that the sediment would be deposited in slow water habitats as it moves downstream it is anticipated that no measurable effects would occur further downstream than ½ mile. The right-turn lane lies adjacent to a small wetland about 0.01 acres in size. The affected environment in this location is the disturbance footprint of the turn lane, which includes the wetland.

- Sunrise Vehicle Maintenance Shop: The affected environment is dependent on the action alternative.

- ▹ Alternative 2, Proposed Action: The affected environment includes the ground disturbance area and Mitchell Creek itself from the Sunrise Parking Lot downstream ½ mile.
  - ◆ Rationale: The maintenance shop itself and associated parking are all located outside Riparian Reserves. Potential impacts to Mitchell Creek are tied to changes in snow storage and removal in the Sunrise Parking Lot resulting from the maintenance shop location. This could lead to increased gravel and sediment in Mitchell Creek. However, given the small size of the creek, naturally high amounts of fine sediment, and the fact that the sediment would be deposited in slow water habitats as it moves downstream it is anticipated that no measurable effects would occur further downstream than ½ mile.

- ▹ Alternative 3: Actual ground disturbance area and a small, perennial tributary to Mitchell Creek from the existing administrative building downstream to the Sunrise Parking Lot.
  - ◆ Rationale: Potential impacts to the unnamed stream from the maintenance shop construction center around increased sedimentation and possibly water contamination. Fine sediment could travel downstream; however, given the very small size of the creek (about 1-foot wide), naturally high amounts of fine sediment, the fact that the sediment would be deposited in slow water habitats as it moves downstream, and the presence of a man-made wetland at the creek terminus just west of the Sunrise Parking Lot that is an effective sediment trap, it is anticipated that no measurable effects would occur further downstream from that point. The distance between the administrative building and the Sunrise Parking Lot, plus the wetland at the creek terminus, would allow natural biological processes to eliminate any pollutants before entering Mitchell Creek.

- ▹ Alternatives 4 and 5: Actual ground disturbance area.
  - ◆ Rationale: This proposed location is on a forested knoll between the Sunrise Parking Lot and Forest Road 3555 (Main Base access road). One small corner of the disturbed area (0.1 acres) is located within a Riparian Reserve surrounding a wetland. This wetland is not connected to Mitchell Creek.

- Utility lines, Sunrise Vehicle Maintenance Shop (Alternatives 2, 4 and 5): Ground disturbance area as outlined in Chapter 2 and the unnamed tributary to Mitchell Creek from the disturbed area near the existing administrative building to the wetland at the tributary terminus near the Sunrise Parking Lot.
  - ▹ Rational: The utility lines would be placed in an existing power line corridor thus the ground is already disturbed. The utility corridor does lie within the Riparian Reserve of the unnamed tributary to Mitchell Creek and also within the same wetland Riparian Reserve discussed above for the Sunrise Vehicle Maintenance Shop in Alternative 4. Disturbance in the latter Riparian Reserve would be confined to the actual disturbed area and the isolated nature of the wetland and PDC would prevent impacts to Mitchell Creek. Although PDC would greatly reduce potential impacts to the unnamed Mitchell Creek tributary it is possible that some increased erosion and subsequent sedimentation could impact the creek.

Given the affected environment defined above, the focus of the remaining existing condition and the effects analysis are focused on Meadows and Mitchell Creeks, as well as the unnamed tributary to Mitchell Creek.

Environmental Baseline

The environmental baseline discussion is divided into two main sections: aquatic species distribution and basic life history; and existing habitat conditions, particularly as they relate to steelhead critical habitat primary constituent elements (PCE) in Meadows Creek. Only those species and associated habitat that are found within the affected environment are discussed and analyzed since there would be no effect/impact to species/habitat outside the affected environment.

Presence of PETS Aquatic Species within the Affected Environment

Fish Presence/Absence: Mitchell Creek and the unnamed tributary to Mitchell Creek are not fish bearing streams. Fish presence/absence surveys were conducted in Mitchell Creek during 1991 and 1997 using electrofishing gear and no fish were found [unpublished data, Mt. Hood National Forest (MHNF)]. Cutthroat trout (*Oncorhynchus clarki*) are found in the East Fork Hood River at the mouth of Mitchell Creek, but that is over a mile downstream of the Sunrise Parking Lot and outside the affected environment. Mitchell Creek is quite steep from the mouth up to Highway 35 (approximately 20% gradient) which precludes fish use. The culvert under Highway 35 is also an upstream migration barrier.

Management Indicator Species (MIS) for the Forest include all salmon and trout species regardless of PETS status. . Because of their relative sensitivity to change, all salmonids were selected as "an indicator species group" for aquatic habitats. This group of species is especially important for their commercial and game values and because they occupy the spectrum of aquatic habitats on the Forest. These requirements are restricted enough that it is reasonable to assume that if the life history needs of salmonids are met, the rest of other fish species found on the Forest would be met (see Forest Plan FEIS, III-58). The state of Oregon, in concert with the regulatory agencies, manages fish populations while the Forest manages the habitat. For a population to be viable, attributes such as species abundance, productivity, spatial structure, and genetic diversity are needed for the species to maintain its capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment. All of these attributes are affected by habitat and other environmental conditions that influence species behavior and survival.

A Forest-wide analysis, available in the project record, was conducted in March of 2011 to determine the quantity and quality of habitat available on the forest for each of the salmonid species. The analysis was performed by calculating the linear distance of stream miles of the intersect between widely available National Hydrography Dataset (NHD) and Streamnet fish distribution layers of the geo database on file at the Mt. Hood National Forest headquarters office. The only MIS fish species known to occur within the project area is cutthroat trout, thus the following discussion focuses on cutthroat. Resident fish distribution (cutthroat and rainbow trout) was determined by utilizing Streamnet and Mt. Hood National Forest legacy fish

distribution data. On the Mt. Hood National Forest resident trout occupy 1,240 miles of habitat[1]. The affected environment includes 0.5 miles of occupied resident (cutthroat) trout habitat.

Cutthroat trout are the only fish species known to reside in Meadows Creek and they are found from the mouth upstream to the end of a large wet meadow complex at river mile 2.5, well upstream of the affected environment (MHNF 1997, unpublished data). Besides residing in Meadows Creek, cutthroat trout are ubiquitous throughout the East Fork Hood River and indeed across much of the Forest. The only major watershed where they are not present is the White River. As such, cutthroat trout occupy upwards of 1,000 miles of stream habitat within the Forest.

In general, cutthroat trout require the same quality habitat as other salmonids – cold, clean water, adequate food (primarily aquatic insects), clean spawning gravel, and hiding and resting places. Suitable habitat is widespread across the Forest although some areas have experienced local degradation due to land management actions or natural events. Population estimates have not been conducted throughout most of their range on the Forest, but based on their widespread distribution and the presence of high quality habitat the populations across the Forest appear healthy and stable.

Steelhead trout (O. *mykiss*) do not reside in Meadows Creek. They do reside in the East Fork Hood River downstream but the uppermost verified sighting was near Polallie Creek about 9 miles downstream of the mouth of Meadows Creek.

Lower Columbia River coho salmon (O. *kisutch*), listed as threatened, are known to ascend the East Fork Hood River at least as far as Dog River, located approximately 14.5 miles downstream from the affected environment. Although there are no barriers they are not present in the East Fork Hood River or tributaries upstream of this point due to habitat constraints. Lower Columbia River Chinook salmon (O. *tshawytscha*), listed as threatened, are also found in the East Fork Hood River, but they do not ascend as far upstream as coho salmon. Bull trout (*Salvelinus confluentus*), listed as threatened, have never been found in the East Fork Hood River watershed within the Forest and are not believed to spawn and rear in the watershed. Middle Columbia River steelhead and Upper Willamette River Chinook salmon do not reside in the Hood River Basin.

<u>Designated Critical Habitat and Essential Fish Habitat</u>: Critical habitat for steelhead trout and Chinook salmon was designated in 2005 by the National Marine Fisheries Service (NMFS) [70 Federal Register 52630, September 2, 2005]. Critical habitat for steelhead trout includes the East Fork Hood River up to Sahalie Falls and Meadows Creek from the mouth up to Highway 35. Therefore, steelhead critical habitat is located in the Meadows Creek portion of the affected environment but not elsewhere. Note that steelhead critical habitat in Meadows Creek is unoccupied by steelhead as mentioned above. Critical habitat for Chinook salmon is not designated within the affected environment. Lower Columbia River (LCR) coho critical habitat has been proposed for designation by NMFS (January 14, 2013; 78 FR 2726) but not within the affected environment.

1 Because resident rainbow and cutthroat trout are found in many watersheds across the Mt. Hood National Forest and their distribution overlaps in many areas the MIS analysis lumped distribution into one category. Cutthroat trout are found in most major watersheds across the forest except White River and thus they likely occupy over two thirds the total resident trout habitat.

Primary constituent elements for steelhead trout are sites and habitat components that support one or more life stages. Meadows Creek is designated critical habitat for spawning and rearing only, thus only the first two primary constituent elements pertain to this project:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
2. Freshwater rearing sites with:
   a. Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;
   b. Water quality and forage supporting juvenile development; and
   c. Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

Bull trout critical habitat was designated in 2010 (75 Federal Register 63898, October 18, 2010); however, critical habitat was not designated within the East Fork Hood River drainage and thus is not found within the affected environment.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance essential fish habitat (EFH) for those species regulated under a Federal fisheries management plan – in this case, Chinook and coho salmon. Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all proposed actions that may adversely affect EFH. Adverse effects include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH.

Pacific salmon (Chinook and coho) EFH was designated in 1999, but the actual identification of stream reaches considered to be EFH was left to the action agencies, such as the US Forest Service. Essential Fish Habitat is coincident with Chinook salmon critical habitat where it's designated and coho salmon where they are known to occur. Therefore, EFH for Chinook and coho salmon is not present in the affected environment.

Aquatic invertebrate presence/absence: There are three aquatic mollusks and two caddisflies known or suspected to occur on the Mt. Hood National Forest included on the Region 6 Regional Forester's 2011 Sensitive Species list (Table 3-52). In addition, there are four additional mollusks and three caddisflies considered strategic species by the Regional Forester. Two of the strategic mollusks (Basalt Juga and Columbia duskysnail) were also listed by the Forest Service et al. (2001) as Survey and Manage Category A species requiring management of known sites and minimizing inadvertent loss of undiscovered sites. Pre-habitat disturbance surveys are required for this species category.

Only sensitive species are required to be addressed in a biological evaluation (Forest Service Manual 2670). Distribution, life history, etc. for many strategic species are poorly understood; thus when they are found while conducting surveys for other species the Forest Service requires recording location(s) in corporate databases established by the agency. For the purposes of this report/biological evaluation, the only two strategic species discussed further are the Columbia duskysnail and Basalt Juga since they are Survey and Manage species as described above.

Surveys for aquatic mollusks have been conducted in various streams throughout the Permit Area in 1998, 1999, 2010, and 2011 (Mt. Hood National Forest, unpublished data). The survey target species was primarily the Columbia duskysnail[2] and Basalt Juga, although Forest Service personnel also searched for the Barren and Purple-lipped Juga in 2010 and 2011 (Dalles Juga was not added to the sensitive species list until December of 2011 thus past surveys have not targeted that species). All surveys were consistent with the 2001 Survey & Manage ROD (Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffers, and other Mitigation Measures Standards and Guidelines).

Table 3-52: Region 6 (R6) special status species either documented (D) or suspected (S) to reside within the Mt. Hood National Forest. Note that "documented" does not necessarily mean the species is found within the affected environment for this EIS; only that its presence has been documented somewhere on the Mt. Hood National Forest. Species also included in Survey and Manage categories outlined in Forest Service et al. 2001 are noted with an X in the 2001 ROD column.

Scientific Name	Common Name	Presence	2001 ROD
Sensitive Species			
Juga hemphilli dallesensis	Dalles Juga	S	
Juga hemphilli hemphilli	Barren Juga	D	
Juga hemphilli maupinensis	Purple-Lipped Juga	S	
Allomyia scotti	Scott's Apatanian Caddisfly	D	
Namamyia plutonis	Caddisfly (no common name)	S	
Strategic Species			
Fluminicola sp. nov. (Pinhead)	Pinhead Pebblesnail	S	
Juga sp. nov. (Basalt)	Basalt Juga	D	X
Juga sp. nov. (Brown)	Brown Juga	S	
Lyogyrus sp. nov. (Columbia)	Columbia Duskysnail	D	X
Lepania cascada	Caddisfly (no common name)	S	
Moselyana comosa	Caddisfly (no common name)	S	
Rhyacophila unipunctata	One-Spot Rhyacophilan Caddisfly	D	

Specific to this project, various locations in Mitchell Creek and Meadows Creek (including tributaries) were surveyed in 1999 and 2011. No aquatic mollusks were found in any stream within the Permit Area in all years surveyed. Based on these results, none of the R6 sensitive mollusks or the two Category A mollusks reside within streams in the affected environment.

Surveys for aquatic insects, primarily caddisflies, were conducted in the Permit Area, including the current affected environment in 1997 and 2011. The latter surveys were conducted in conjunction with aquatic mollusk surveys. Several caddisfly cases and individuals were collected and preserved in 2011, but classifying them to the genus and species level has yet to occur. The surveys in 1997 were more comprehensive and included sampling sites in both Mitchell and Meadows Creeks. Survey information and species collected were summarized by Wisseman

2 The Columbia duskysnail was considered a sensitive species in Region 6 prior to December 2011.

(1997). This survey provides the bulk of definitive information regarding aquatic insect presence in the Permit Area. The following outlines the known information for the two R6 sensitive caddisflies.

Identification of Scott's Apatanian caddisfly adults is very difficult and depends somewhat on the time of year sampling occurs and expertise of the collector to identify them. The larval form is easier to identify, but confirmation with a taxonomic expert is recommended. Caddisfly larvae/adults of the *Allomyia* genus were captured during aquatic invertebrate surveys conducted in the Permit Area by Wisseman (1997) but definitive species identification was not possible.

Species of *Allomyia* occur in forested mountain areas below the sub-alpine zone in North America. The larvae inhabit small, cold streams and according to Wiggins (1973) *Allomyia scotti* may be associated with moss in their habitats. Scott's Apatanian caddisfly is known to reside in four streams on Mt. Hood: an alpine stream 3.3 miles below Timberline Lodge, 4,200 feet (SW ¼ Sec13 T3S R8E; Wiggins 1973); the South Fork of Iron Creek (Sec15-16 T3S R9E; Anderson 1976); from a stream (likely the creek known as "Green Apple Creek" that is a tributary to White River) at the junction of Highway 35 and Forest Road 48 (SE ¼ Sec16 T3S R9E; ONHP 2005), and in a tributary to the Salmon River (ONHP 2005). The species may occur in other localities on or near Mt. Hood; however, extensive surveys have not been conducted.

Because two of the four known Scott's Apatanian caddisfly locations are near MHM (Iron Creek and the stream at the Highway 35/Road 48 junction), suitable habitat is present in the affected environment, and caddisfly larvae/adults of the *Allomyia* genus were captured during surveys conducted in the Permit Area in 1997 (Wisseman 1997) it is probable that Scott's Apatanian caddisfly resides in streams within the affected environment and for the purposes of this analysis they are considered present. Since this caddisfly is a stream dwelling macroinvertebrate, at least during its pre-adult life stages, its presence in wetlands within the affected environment is unlikely, but not completely discountable. Adults, which are flying insects, could be found near open water wetlands but it is not their preferred habitat and their abundance would be low.

Little is known about the specific life history characteristics of *Namamyia plutonis* but it is likely that their life history is similar to other caddisflies in general (including *Allomyia scotti*) as described by Spellman (2008). They have been found in small streams in densely forested old growth or mature forest watersheds, and larvae have been found in core samples collected from areas composed of coarse gravel mixed with silt and organic sediments (Anderson 1976). They are known to reside in the Coastal and Cascade Ranges of Oregon and California, including documented occurrences in the Rogue River-Siskiyou, Siuslaw, and Willamette National Forests (Anderson 1976), and a recent occurrence in the Rogue River-Siskiyou National Forest (Borgias and Wisseman 1999).

Namamyia plutonis has never been documented in the Forest, but suitable habitat appears present. Although over 20 caddisfly species were captured in the Permit Area and described by Wisseman (1997), *Namamyia plutonis* was not among them. Based on that survey *Namamyia plutonis* is not believed to inhabit streams within the Permit Area/affected environment.

Existing Aquatic Habitat Conditions within the Affected Environment

The primary aquatic habitat parameters that could be affected by the proposed projects include stream shade and subsequently water temperature; substrate fine sediment levels in streams and wetlands, and water quality in terms of pollutants other than temperature and sediment.

Headwaters East Fork Hood River 7th Field Watershed: Stream shade is generally high within the affected environment in this 7th field watershed. Most shade is provided by a mix of coniferous (primarily hemlock) and deciduous vegetation (willow, alder, etc.) and because Mitchell Creek and the tributary are small, narrow and in places very confined, so the shading is generally high (Figure 3-15). Water temperatures are well within Oregon State standards and within (or even below) the optimal range for salmonids (see Water Quality Specialist Report). Even in areas where shading is not prevalent (primarily the meadow-like areas surrounding the unnamed tributary, Figure 3-16) the water is cold given the elevation and the fact that the creeks in the affected environment are close to their source.

There is a relatively high amount of fine sediment in both Mitchell Creek (Table 3-53) and the unnamed tributary due to the naturally erosive volcanic soil. Mitchell Creek is steep and incised and fine sediment is routed downstream with deposition occurring in pools and other slack water areas. The unnamed tributary is relatively flat near the administrative building, but steepens considerably about half way between the administrative building and the Sunrise Parking Lot. At the Sunrise Parking Lot the creek enters a man-made wetland and there is no definable channel and thus no evidence of surface flow (there was no surface water in the wetland on October 15, 2011 when a field survey was completed). Substrate composition surveys have not been conducted in the unnamed tributary; however, based on the cursory ocular survey conducted on October 15, 2011 the substrate is dominated by sand/silt in the flatter areas and gravel/cobble in the steeper middle section.

Meadows Creek 7th Field Watershed: As in the Headwaters East Fork Hood River, stream shade is generally high within the affected environment in this 7th field watershed. Shade is provided by a mix of coniferous (primarily hemlock) and deciduous vegetation (willow, alder, etc.) and the shading is generally high (Figure 3-17). Water temperatures are well within Oregon State standards and within the optimal range for salmonids (see Water Quality Specialist Report). Even in areas where shading is not prevalent the water is cold given the elevation and the fact that the creek in the affected environment is close to its source.

Meadows Creek also contains high amounts of fine sediment <2mm (Table 3-53). The high amount of fine sediment directly below Forest Service Road 3545 is due to a large, flat meadow section immediately upstream that is dominated by fine sediment. The lower surveyed section is steeper and thus acts more as a sediment transport, rather than depositional, reach. Smaller sized substrate can be transported downstream rather quickly in a transport reach.

Figure 3-15. A photograph of a representative section of Mitchell Creek located within the affected environment. Mitchell Creek is generally well shaded by the surrounding vegetation and topography

Figure 3-16. A photograph of a representative meadow section of the unnamed tributary to Mitchell Creek located within the affected environment. Although not visible the creek is in the center left of the photograph. This location happens to be directly adjacent to the administration building near the Main Base.

Table 3-53: Stream surface substrate conditions within representative sections of Mitchell and Meadows Creeks within the affected environment. All surveys were pebble counts utilizing a zigzag method to sample all habitat types in a 200 foot long stream section. The column labeled "<2mm" is the percentage of substrate less than 2mm in diameter (i.e. sand and silt). The remaining three columns are measures of the cumulative sediment distribution. For example, the D50 is the particle size (in mm) that 50% of the samples are equal to or smaller than.

Stream	Location	Survey Year	<2mm	D35	D50	D84
Mitchell Creek	Above Sunrise Parking Lot	1997	44%	<2	6	64
		1998	32%	<2	7	56
Mitchell Creek	Below Sunrise Parking Lot	1997	43%	<2	6	78
		1998	34%	<2	7	53
Meadows Creek	Directly below Forest Service Road 3545	1997	38%	<2	7	62
		1998	35%	<2	8	53
Meadows Creek	0.1 mi below Forest Service Road 3545	1997	23%	7	20	98
		1998	8%	17	42	115

Figure 3-17: A photograph of a representative section of Meadows Creek located within the affected environment. Meadows Creek is generally well shaded by the surrounding coniferous and deciduous vegetation.

None of the creeks in the affected environment are listed on the Oregon 303d list for water quality in terms of pollutants. There are no known chronic sources of chemicals or excessive nutrients that would lead to impaired water quality (see Water Quality Specialist Report).

Given that Meadows Creek is designated steelhead critical habitat below Highway 35 the following discusses the spawning and rearing primary constituent elements in Meadows Creek within the affected environment. Much of the information presented below is based on available stream survey information (MHNF, unpublished data) as well as surveys of the area for a variety of projects conducted by Forest Service fisheries/watershed personnel.

- Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
  - ▹ Water Quantity and Quality: Water quality in Meadows Creek is excellent. The water is clean, cold and there are no known chronic sources of pollution or nutrient input. Meadows Creek is a small stream that is fed by springs and snowmelt. Stream flow information has not been collected in detail and what little flow information is available was recorded during low flow conditions in summer and fall. Based on professional experience, Meadows Creek has enough water during the steelhead spawning period (April – June) to support steelhead spawning but spawning habitat that would have the right mix of depth, water velocity, and substrate (Bjornn and Reiser 1991) would be limited given the small stream size. Suitable habitat exists, but it is not prevalent.
  - ▹ Spawning: Steelhead trout spawn in substrate ranging in size from less than 0.5 inches to over 4 inches (Bjornn and Reiser 1991). Based on steelhead redds found in other streams on the eastside of the Forest they prefer substrate ranging from 2-4 inches in diameter (MHNF, unpublished data). Redd size, in terms of area, varies and depends largely on stream size, but ranges from 4-15 square feet in other streams in the vicinity (MHNF, unpublished data). This combination of substrate size and patch size is not common in Meadows Creek given its small size – in general the gravel is small (<2 inches) and suitable patches of gravel occupy a small area of the channel. However, suitable spawning areas do exist where conditions permit.
  - ▹ Incubation and Larval Development: Given cold, clean water and the fact that steelhead clean much of the fine sediment from the redd during the digging process conditions in Meadows Creek for incubation and larval development are well within suitable ranges.

- Freshwater rearing sites with the following habitat characteristics:
  - ▹ Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility.
    - ◆ Existing physical habitat conditions are within the range of natural condition given watershed and stream size. Although some disturbance has occurred in the headwaters due to past ski area development, there has been little apparent impact to the stream and floodplain.
  - ▹ Water quality and forage supporting juvenile development.
    - ◆ Water quality is excellent as described above. There have been no definitive surveys or studies in Meadows Creek to assess forage abundance and diversity; however, a variety of taxa were documented across the Permit Area by Wisseman (1995 and 1997), including Meadows Creek. The streams in the Permit Area are

high elevation montane streams with productivity naturally lower than streams at lower elevations. Forage is present and the presence of cutthroat trout in Meadows Creek is proof that enough food is available to support a salmonid population.

- Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
  - Cover is present in Meadows Creek primarily in the form of substrate (large rocks/boulders), overhanging riparian vegetation, and instream and overhanging large wood. Cover amounts vary depending on the location, but there are no known reaches devoid of cover.

3.5.4. Effects Analysis/Environmental Consequences

There are no federally proposed or listed fish species that reside in the affected environment, nor are there any R6 sensitive fish species present within the affected environment. Only one of five sensitive aquatic species (Scott's Apatanian caddisfly) is considered present in the affected environment. Cutthroat trout are found within Meadows Creek within the affected environment. Designated critical habitat for steelhead trout includes Meadows Creek within the affected environment below Highway 35; designated critical habitat for other listed salmonids and essential fish habitat is not present in the affected environment. Neither of the Survey and Manage aquatic mollusks, both known to occur elsewhere on the Forest, resides in the affected environment.

Given the above the following effects analysis summary will only address the following aquatic species/habitat for each alternative:

- Designated critical habitat for steelhead trout in Meadows Creek;
- Scott's Apatanian caddisfly (note that this species can be considered a surrogate, in terms of effects, for other aquatic invertebrates present in the affected environment); and,
- Cutthroat trout.

From an aquatic effects perspective, there is a great deal of similarity between the alternatives despite differences in proposed infrastructure size and location due to PDC, relatively small changes in proximity to Riparian Reserves, and lack of direct connectivity to streams. As such, the potential impacts are described completely for the various proposed projects in the alternative where they are first described, but in subsequent alternative sections they are incorporated by reference only.

No Action (Alternative 1)

None of the proposed projects would be implemented if this alternative were chosen. As such, there would be no ground disturbing actions and thus no effect to the aquatic environment and fauna. Habitat conditions for aquatic fauna would remain essentially unchanged from the existing conditions unless natural events, such as floods or fire, occurred.

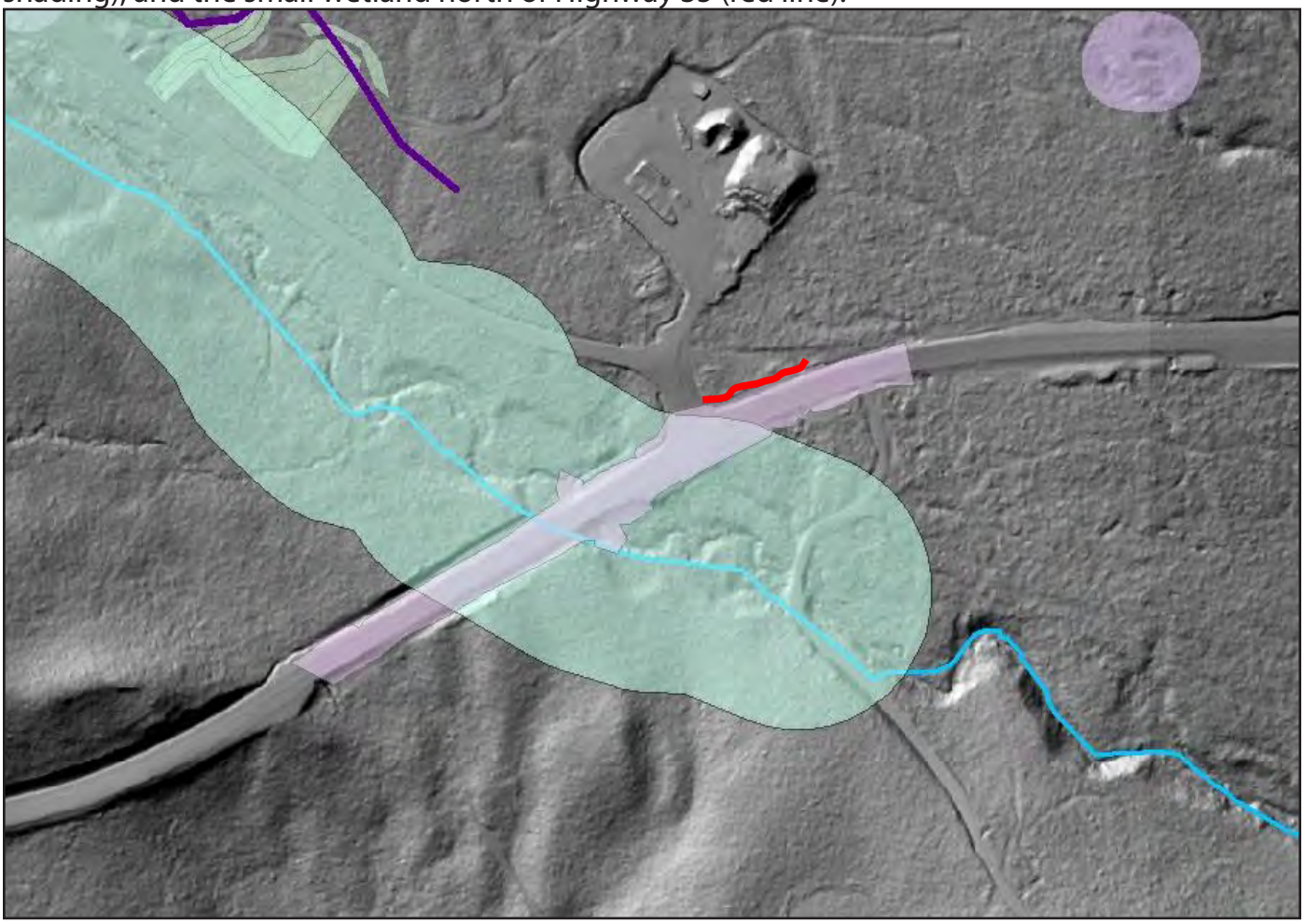
Proposed Action (Alternative 2)

Direct Effects

Direct effects are those that occur during project implementation, in this case construction actions, such as tree removal, parking lot grading and paving, and left- and right-turn lanes construction. To directly impact aquatic species/habitat the activity needs to be in close proximity to the water body where they reside, often within the water body itself. From an aquatic perspective, direct effects most often result in disturbance to aquatic organisms – forcing movement or a flight response. Depending on the activity, it is possible that individuals can be injured or killed; this case is almost always a result of people or equipment working directly in water. Direct habitat effects are possible but depend on the activity. For example removal of vegetation directly adjacent to a stream can immediately reduce shade thus reducing available cover for fish.

None of the proposed projects in Alternative 2 would result in direct effects to aquatic organisms or habitat except the left- and right-turn lanes on Highway 35 (Figure 3-18 and Table 3-54). All other projects are not adjacent to streams or wet areas and thus equipment related and other potential disturbance would not occur. It is likely that construction activities associated with the left turn lane would result in disturbance to cutthroat trout, but actual injury or death is extremely unlikely as equipment would not work in the channel itself. The disturbance would result in fish moving away from the area, but there would be no effect on survival or reproductive success. Scott's Apatanian caddisfly individuals could be displaced or possibly injured during construction, but direct mortality is unlikely given that equipment would not operate in the channel.

Figure 3-18: Lidar imagery that shows the location of the anticipated left- and right-turn lanes disturbance (purple) in relation to Meadows Creek (blue line) and its Riparian Reserve (light blue shading), and the small wetland north of Highway 35 (red line).



Right-turn lane construction would not directly impact Meadows Creek (and thus fish and aquatic macroinvertebrates residing therein) because of the proximity to the creek. Scott's Apatanian caddisfly adults utilizing the wetland north of Highway 35 (likely few in number if present at all) could be displaced at the least and possibly injured or killed during turn lane and wetland relocation. Of course, given the nature of the disturbance (complete obliteration of the existing wetland followed by wetland relocation), any larval or adult aquatic macroinvertebrates that could not escape from the construction area would be killed.

Table 3-54: Potential direct effects resulting from project activities proposed in all action alternatives.

Action Proposed	Alternative					Rationale
	2	3	4	5	6	
Left- and Right-Turn Lanes	Yes	Yes	Yes	Yes	Yes	Right and left turn lane construction within existing road right of way adjacent to small wetland and Meadows Creek, respectively. Right-turn lane construction could result in injury or death to adult Scott's Apatanian caddisflies. Left-turn lane construction activities directly adjacent to Meadows Creek could disturb cutthroat trout, but would not result in injury or death.
Twilight Parking Lot	No	No	No	No	No	Not directly adjacent to Meadows Creek or any other surface water body regardless of alternative. Despite overlap with Meadows Creek Riparian Reserve in all alternatives there is no activity adjacent to surface water. Forest Service Road 3545 is located between proposed infrastructure and Meadows Creek and acts as a barrier to contaminant and/or sediment introduction to the creek.
Twilight Equipment Maintenance Yard	No	No	No	No	No	Same as Twilight Parking Lot above.
Nordic Trails	No	No	No	No	No	Not directly adjacent to Meadows Creek or any other surface water body regardless of alternative. Despite overlap with wetland Riparian Reserve for Alternative 5, there is no activity adjacent to surface water.
Nordic Guest Services Building	No	No	No	No	No	Not directly adjacent to Meadows Creek or any other surface water body regardless of alternative. The building would be placed on paved surface of parking lot and there would be no direct impact to any water body regardless of alternative.
Sahalie Falls Hiking Trail	No	No	No	No	No	Re-route only proposed in Alternatives 4 and 5. Small amount overlapping wetland Riparian Reserve in Alternative 5 would have no direct impact to small wetland.
Sunrise Vehicle Maintenance Shop	No	No	No	No	No	Not directly adjacent to Mitchell Creek in any alternative and located outside Riparian Reserves in Alternative 2. The shop is located within Mitchell Creek unnamed tributary Riparian Reserve in Alternative 3; however, equipment not working in stream channel and there is no direct impact to habitat or disturbance to aquatic macroinvertebrates. Proposed activities not directly adjacent to wetland in Alternatives 4 and 5 despite Riparian Reserve overlap.
Associated Utility Lines	No	No	No	No	No	Not directly adjacent to Meadows or Mitchell Creeks. The trenching near unnamed tributary to Mitchell Creek is far enough away that direct effects to aquatic macroinvertebrates would not occur regardless of alternative.

Indirect Effects

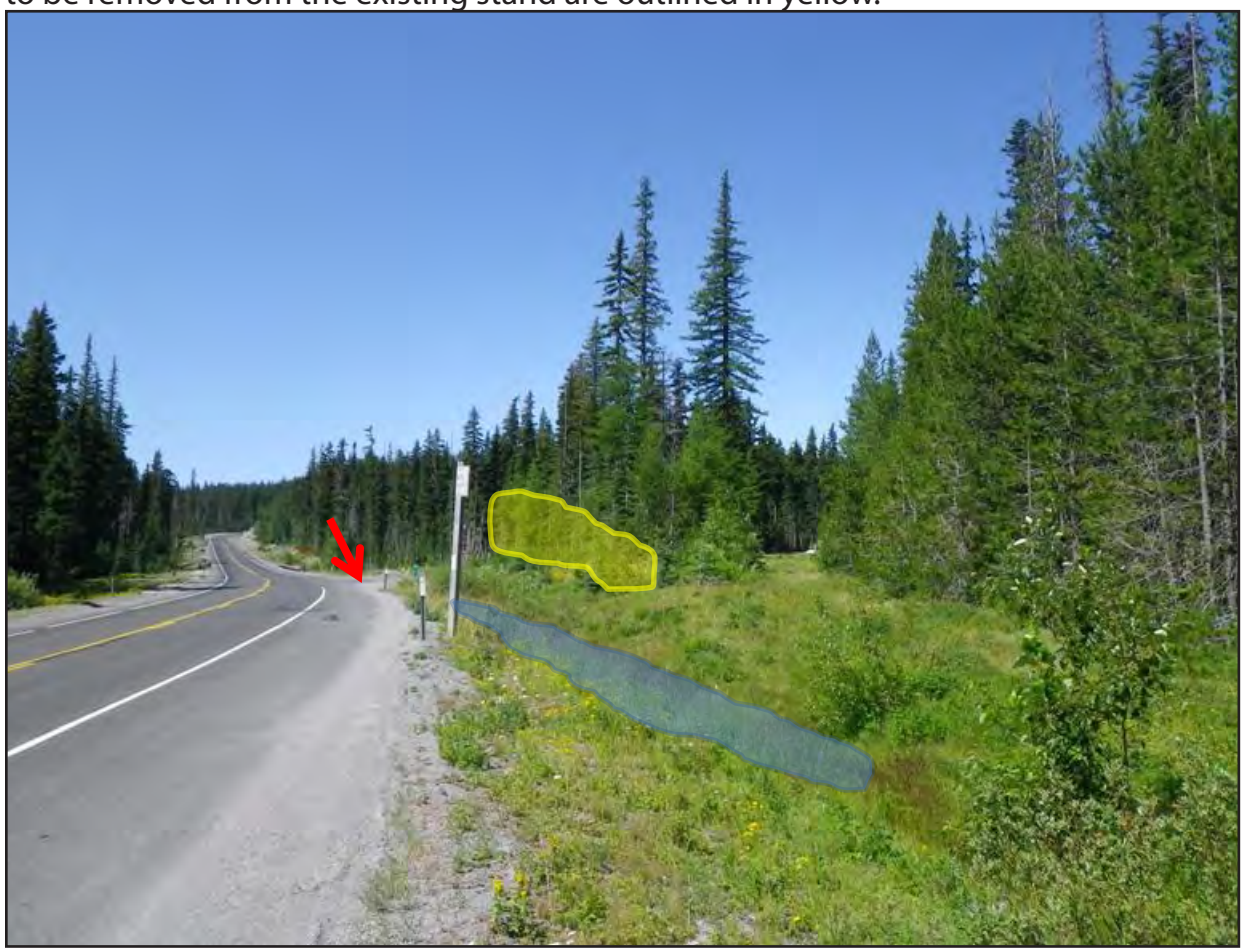
Indirect effects are those that can result after project implementation and/or as a result of implementation. For example, in the vegetation removal scenario mentioned above in the Direct Effects section the indirect effect associated with shade reduction could be an increase in water temperature. The magnitude of such an effect, if it occurred, would depend on the amount of vegetation removed, location and elevation of the stream, amount of stream flow, etc.

The impacted acres (tree clearing, grading, paving, etc.) for proposed activities in this alternative total about 18.1 acres. Most of that is associated with the Twilight Parking Lot with the associated access road and maintenance yard (12.5 acres). Those projects with some Riparian Reserve encroachment, the Twilight Parking Lot (including access road, maintenance shop, and utility lines), left- and right-turn lanes, and the Sunrise Vehicle Maintenance Shop utility lines, impact very little Riparian Reserves area (3.7 acres) Sunrise Vehicle Maintenance Shop(Table 3-35). The majority of the potential Riparian Reserve disturbance is associated with the left- and right-turn lanes (2.9 acres). The following discussion focuses on those habitat parameters that could be affected by proposed activities, namely water temperature, stream bed sediment, and water quality/chemical contamination.

Stream Shade/Water Temperature

No vegetation would be removed adjacent to any water body except the wetland near the right-turn lane in Alternative 2 so shade reductions that could result in water temperature increases would not occur. The trees near the right-turn lane wetland (Figure 3-19) provide little shade currently, and enough trees in the existing stand north of the wetland would remain after construction to provide the same amount of shade.

Figure 3-19: Photograph taken from the north side of Highway 35 looking southwest towards the wetland (shaded blue) adjacent to Highway 35 at the FSR 3545 junction (red arrow). The replacement wetland would be located right of the existing wetland and the current ground configuration would be replicated as closely as possible. Trees to be removed from the existing stand are outlined in yellow.



Sediment/Turbidity – Mitchell Creek

Potential indirect effects associated with proposed activities in this alternative center around increased stream sedimentation and/or turbidity in Mitchell and Meadows Creeks. Each will be discussed separately below.

The potential for increased sedimentation into Mitchell Creek is not associated with construction activities or the proposed location of the Sunrise Vehicle Maintenance Shop directly. The shop would be located across the parking lot from Mitchell Creek and erosion control during and after construction as outlined in the PDC would eliminate the possibility that sediment would enter Mitchell Creek as a result of the maintenance shop construction.

Once the maintenance shop is built however, it is anticipated that snow removal and storage strategies currently used would change so that snow is not blown or stored along the northern edge of the parking lot where the maintenance shop would be located. This would result in more snow, and any associated gravel and/or soil, being blown or pushed and stored along other edges of the parking lot, including the southern edge that borders Mitchell Creek.

The actual increase in sediment that would reach Mitchell Creek is unknown; however, now that the parking lot is paved there is less of a chance that sediment would be caught up in blown/pushed snow than when the parking lot was aggregate surface. When the parking lot was paved a bioswale was also built along the southern edge of the lot to intercept stormwater and sediment before it reached Mitchell Creek. MHM also attempts to minimize sediment impacts to Mitchell Creek by not applying traction gravel closer than 130 feet from the southern end of the lot based on the distance that blown snow travels. Forest Service personnel, however, have observed some traction gravel between the bioswale and Mitchell Creek indicating at least some sediment ends up where it can then erode into Mitchell Creek. Whether this sediment was due to blown snow or pushed snow is unknown.

Any increase in sedimentation into Mitchell Creek resulting from altered snow plowing and movement tactics is difficult to predict. The amount would likely be more than current levels, which is much less than historic levels due to paving and bioswale construction. Not all sediment that is deposited on the stream side of the bioswale would make its way into Mitchell Creek. Some would be captured by topography and/or vegetation. Any sediment entering Mitchell Creek would be a very small amount, but some small pockets of increased sediment would likely be present. Where this sediment would be stored depends on flows and where it enters the creek. In general, the sediment from the parking lot is small enough that it would be deposited in slow water areas such as stream margins and pool habitat. The sediment would gradually move downstream and become dispersed over a much longer stream reach. Within 0.5 miles of the parking lot, the extra sediment would be immeasurable against background levels. Because of the generally slow metering of the sediment introduction increases in turbidity are not expected.

The utility line that would service the Sunrise Vehicle Maintenance Shop would be located next to the unnamed tributary to Mitchell Creek and some soil disturbance would occur near this small stream. As outlined in the Water Quality Specialist Report, however, PDC and BMPs would be incorporated to minimize the amount of disturbance and erosion, so sedimentation into the creek is unlikely.

The effect of fine sediment (sand/silt) deposition on macroinvertebrate production, survival, and species composition is relatively well documented. Bjornn et al. (1974 and 1977) found riffles with the most sediment contained the lowest abundance of insects in Idaho streams but small amounts of sediment added to riffles in streams did not greatly affect abundance or drift. In laboratory studies they concluded that embeddedness levels more than one third around cobbles decreased insect abundance by over 50 percent, especially riffle-inhabiting taxa (e.g., stoneflies, mayflies, and caddisflies), which are most important as salmonid food. Other laboratory studies have supported these results (McCelland and Brusven 1986). The reduction in abundance associated with fine sediment appears to be related to respiration (Rutherford and Mackay 1986) and possibly the loss or reduction of organic detritus which is a source of food for macroinvertebrates (Culp et al. 1983). Most studies have focused on aquatic insects as these are more important as fish food, but it is likely that impacts to aquatic mollusks are similar.

In streams where large amounts of fine sediment have been deposited both by natural and anthropogenic sources re-colonization from upstream has occurred rapidly once conditions improved (Cline et al. 1982; DeWalt and Olive 1988; Tsui and McCart 1981). Therefore, episodic events such as large storms and construction projects may be less harmful over the long term

compared to chronic sources of sediment. None of the proposed activities would result in chronic sources of sediment due to proximity to surface water (see Table 3-36 and associated discussion in the Water Quality Specialist Report) and PDC requiring stormwater (and thus sediment) management.

Mitchell Creek is likely in a state of recovery from past conditions because amounts of fine sediment (including small gravel) reaching the creek from the Sunrise Parking Lot is much less due to recent improvements. Even though slightly more sediment may be introduced as a result of altered snow plowing and movement, as described above, the overall amount would be much less than previous levels and the creek should continue to recover overall, with less fine sediment, as the sediment is moved downstream. The amount of sediment reaching Mitchell Creek from the parking lot may have little effect on macroinvertebrate abundance given the results in natural streams described by Bjornn et al. This is especially true since the fine sediment load in Mitchell Creek is relatively high naturally given the volcanic, erosive soils in the area.

To summarize, the amount of fine sediment reaching Mitchell Creek resulting from the maintenance shop construction and subsequent changes in snow plowing and movement is expected to be slightly higher than existing levels. This increase in sediment could have very localized effects on the streambed, e.g. larger deposits in slack water areas and pools. This in turn could locally impact aquatic macroinvertebrates by impacting their food source and/or affecting individual respiration. However, over time stream conditions in Mitchell Creek in terms of fine sediment levels should improve, even with the altered snow plowing and movement, thus potentially resulting in an increase in macroinvertebrate numbers and diversity.

Sediment/Turbidity – Meadows Creek

Some increase in fine sediment levels is expected in Meadows Creek resulting from construction of the left-turn lane on Highway 35. As described in the Water Quality Specialist Report, the left-turn lane construction would fall within previously disturbed areas associated with Highway 35 and erosion control measures, proven effective in recent Highway 35 construction, would be employed. Given the proximity of the construction to Meadows Creek (about 10 feet at the closest point) it is unlikely that absolutely no fine sediment would enter the stream. The amount of fine sediment would be quite small but likely more than would be expected in Mitchell Creek. No sediment would enter Meadows Creek from right-turn lane construction because there is no direct connection for surface water to enter the creek.

Although water quality standards are expected to be met (Water Quality Specialist Report) there could be localized impacts to habitat very similar to those described above for Mitchell Creek. Some small pockets of increased sediment deposition would likely be present, primarily in slow water areas such as pools and stream margins. The sediment would gradually move downstream and become dispersed over a much longer stream reach over time. Within 0.5 miles of the Highway 35 crossing, the extra sediment would be immeasurable against background levels. It is unlikely the additional sediment would be measureable immediately below the Highway. Because of the generally slow metering of the sediment, introduction increases in turbidity are not expected.

Impacts to aquatic macroinvertebrates from small increases of fine sediment over natural background levels would be the same as described above in Mitchell Creek – a higher risk of food source impacts and/or reduced respiration efficiency of individuals. If the impacts are great

enough, the aquatic insects may drift downstream to avoid the disturbance. If this occurred, individuals from upstream would re-colonize the area relatively quickly.

Impacts to cutthroat trout individuals resulting from fine sediment increases would be minimal. The fish are able to move about quickly and easily, especially compared to insects, and such movement is common in response to environmental stimuli such as food abundance and water temperature. If enough insects emigrated downstream due to an increase in fine sediment then the fish could follow them to continue feeding. A complete exodus of cutthroat trout from the area is unlikely. There would be no impact to survival resulting from such movement.

The localized impacts to salmonid spawning and rearing habitat from increased fine sediment input as mentioned above would be discountable at the site or reach scale due to the small amount of sediment expected. Some sediment deposition in spawning habitat (riffles and pool tails) is possible, but unlikely, because the higher water velocities in these areas would transport most of the sediment downstream into slower water habitats. What little sediment might be deposited would not be enough to impact spawning and thus reproductive success. Although some sediment could slightly fill pools, there would be little effect on available rearing space.

Water Quality/Chemical Contamination

An indirect effect associated with parking lot and maintenance area construction is the possibility of water contamination by automotive products, such as fuel and oil (see Water Quality Specialist Report) resulting from recreational and/or MHM vehicles. PDC are designed to eliminate the possibility that chemical contaminants would reach surface water in the event of a spill during construction activities. Therefore, the following discussion focuses on potential effects once the parking and maintenance areas are completed and in use.

Overview of chemical routing into water: Whether petrochemicals would enter water in a high enough concentration to affect aquatic fauna depends on two primary factors:

- The amount of the chemical(s) reaching water (which in turn is a function of the chemical physical properties, amount spilled, proximity to water, and routing path); and,
- The toxicity and solubility of the chemical(s) in question.

In this analysis, it is assumed that the most likely locations where contamination could occur are in parking and maintenance areas as spills are unlikely while driving to and from these areas. As described in the Water Quality Specialist Report, Shepp (1996) theorized that the most likely time a vehicle would discharge petrochemicals would immediately follow starting or shutting off the vehicle and the amount discharged would generally be minimal, if any were discharged at all. Vehicles parked for long periods are not likely to discharge contaminants. Thus, the amount of contamination resulting from a single vehicle any given day would be small to none, but some contaminant discharge is likely from a subset of vehicles in any parking area.

The maintenance areas would inherently have a much higher risk of a contaminant spill because of the maintenance activities performed (refueling, changing the oil, etc.). Furthermore, given the nature of these maintenance actions the amount spilled would generally be much higher than from starting or shutting off a vehicle. Therefore, even though the number of vehicles in parking areas greatly exceeds those in the two proposed maintenance areas, the chance for a spill resulting in relatively large quantities of petrochemical contaminants is much greater in maintenance areas.

To reach surface water once spilled, the chemical would have to travel over the paved surface and then be routed above and/or below the soil surface to the groundwater and/or closest surface water body. As the routing distance to water increases, less of the chemical would enter the water due to evaporation, soil binding, and chemical breakdown. Gasoline and to a lesser extent diesel fuel are highly volatile and thus would evaporate rapidly (unless spilled in large quantities near the edge of the lot) so very little would even reach the edge of the pavement.

Stormwater management systems are designed for the Twilight Parking Lot and maintenance areas; the Sunrise Parking Lot already has a stormwater management system in place. These stormwater management systems are designed to intercept, absorb, bind and break down pollutants in parking lot runoff before reaching ground and surface water. The systems incorporate a variety of methods to do this, including routing paths via grading to keep runoff from directly entering surface water, bioswales, and other vegetated areas that trap water and sediment. Based on water quality monitoring (see the Water Quality Specialist Report) and observation over the last several years by Forest Service personnel, it appears the stormwater management systems in place at the Main Base and Sunrise Parking Lots are effective in preventing polluted runoff from reaching area streams. There is every reason to assume similar results at the proposed Twilight Parking Lot and maintenance areas.

If a spill occurred the amount reaching surface water and the effect on the aquatic environment would be minimal due to parking lot/maintenance area proximity to water and stormwater management systems. Crabtree (2004) conducted an extensive literature review that summarized the fate and effect of a wide variety of petroleum chemicals on water quality and fisheries from a ski area parking lot. He determined flushing of hydrocarbon toxins into a creek from a paved parking lot in concentrations that would have any biological effects were unlikely. The following summarizes his findings.

- Vehicle fluids most likely to be discharged from a vehicle and possibly flushed into a stream are lubricants, hydraulic fluids, and antifreeze.
- Lubricants and hydraulic fluids (except brake fluid) are composed of higher molecular weight hydrocarbons that are of low solubility (i.e. they float) and low toxicity to fish and other organisms.
- Antifreeze is of very low toxicity and short half-life in the aquatic environment. Brake fluid is probably similar to antifreeze in its biological effects.
- The most toxic automotive fluids are gasoline and diesel. The volatility of gasoline, and to a lesser extent, some components of diesel, ensures that much would evaporate before entering a stream.
- Only a small proportion of vehicles used for private transportation use diesel as a fuel, which makes leakage of diesel less likely.
- Runoff from parking lots would be episodic, with periods of no runoff alternating with periods of runoff. Fish would be exposed to (somewhat) elevated levels of hydrocarbons for a few hours or a few days, followed by days, weeks, or months with no exposure.

Summary of Indirect Effects

Given the proposed locations of parking and maintenance areas in this alternative, distance from surface water (and lack of connectivity), and existing and proposed stormwater management systems, there is a negligible risk that water quality would be impacted by chemical contaminants and thus there would be no anticipated effect to aquatic fauna. Most of the proposed

infrastructure is located outside Riparian Reserves and portions within Riparian Reserves, except the left- and right-turn lanes, are not hydrologically connected to streams/wetlands that support aquatic fauna. Public vehicles would not be parking at the left- and right-turn lanes so no contaminant spills are anticipated by vehicle traffic. Construction PDC would ensure that chemical contaminant impacts do not occur.

Cumulative Effects

Cumulative effects include the effects of past, present and reasonably foreseeable future State, tribal, local or private actions that overlap in time and space within the Action Area (i.e. affected environment) of the Federal action subject to consultations (50 CFR 402.02). The "reasonably foreseeable" clause is a key factor in assessing and applying cumulative effects and could include actions that are permitted, imminent, have an obligation of venture, or have initiated contracts (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998). Past and present impacts are incorporated as part of the environmental baseline and discussed here in the effects discussion.

Only those proposed projects or portions of project proposed in this EIS that have direct or indirect effects are included in the cumulative effects analysis (if the action has no direct/indirect effects there is nothing to cumulate). The spatial context for the following cumulative effects analysis is the affected environment as described previously. Project/activities occurring outside this area may have an effect on aquatic species/habitat, but would not add to those effects from projects proposed in this EIS in the affected environment. The temporal context depends on the existing or future project/activity – if there is an overlap in time from an effects perspective then it is included. Cumulative effects are outlined in Table 3-55, below.

Summary of Cumulative Effects

Although there are several projects in the action area that overlap in time and/or space with proposed projects the expected cumulative effects are minimal due to project proximity and PDC for both proposed projects and existing that greatly reduce potential impacts. The only projects that have the potential to result in a cumulative effect (fine sediment related) to aquatic species or habitat are snow movement and removal activities in the Sunrise Parking Lot and Highway 35 traction sanding.

Table 3-55: Summary of cumulative effects to aquatic fauna and habitat in Alternative 2. Effects are described in the column titled "Extent, Detectable?"

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species and Stream Habitat Effects
		Time	Space			
Past MHM Ski Area Projects	Stream Temperature	No	Yes	No	Projects are completed. No remaining sediment, stream temperature and water quantity effects due to mitigation measures and design criteria implementation on the original projects and natural recovery.	None
	Suspended Sediment	No	Yes	No		
	Water Quantity	Yes	Yes	No		
Stadium Lift, Blue Wetland Enhancement and Access Road Culvert Replacement	Stream Temperature	Yes	Yes	No	Mt. Hood Meadows Parking Lot Improvement Project would maintain the primary shade zone so there should be no increase in stream temperature.	None
	Suspended Sediment	Yes	No	No	There may be an overlap in timing of this project with the Mt. Hood Meadows Parking Lot Improvement Project; any minor suspended sediment would not be measurable due to implementation of PDC and conformance with existing standards and guidelines in both projects. Additionally, no mixing of sediment from either project is expected due to the long distance from project areas to the confluence of Meadows Creek, Mitchell Creek and the East Fork Hood River.	None
Highway 35 Betterment Project – Clark Creek Wetland Enhancement	Stream Temperature	Yes	No	No	Mt. Hood Meadows Parking Lot Improvement Project would maintain the primary shade zone so there should be no increase in stream temperature.	None

Table 3-55: Summary of cumulative effects to aquatic fauna and habitat in Alternative 2. Effects are described in the column titled "Extent, Detectable?" (Continued)

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species and Stream Habitat Effects
		Time	Space			
Highway 35 Betterment Project – Clark Creek Wetland Enhancement (continued)	Suspended Sediment	Yes	No	No	There may be an overlap in timing of this project with the Mt. Hood Meadows Parking Lot Improvement Project; any minor suspended sediment would not be measurable due to implementation of PDC and conformance with existing standards and guidelines in both projects. Additionally, no mixing of sediment from either project is expected due to the long distance from project areas to the confluence of Meadows Creek, the wetland near the Highway 35/FSR3545 junction, Clark Creek and the East Fork Hood River.	None
Highway 35 Betterment Project – Meadows Creek Culvert Replacements	Stream Temperature	Yes	Yes	No	The culvert replacement projects and left- and right-turn lanes would maintain the primary shade zone so there would be no increase in stream temperature.	None
	Suspended Sediment	No	Yes	No	The culvert replacements would temporarily increase suspended sediment and turbidity immediately after project completion. This increase is expected to be of short duration as stream flow is returned to the culverts. The project in the Mt. Hood Meadows Parking Lot Improvements EIS most likely to have a potential for a cumulative effect is construction of the left-turn lane, but any minor suspended sediment would not be measurable due to implementation of PDC and conformance with existing standards and guidelines. This work would be asynchronous with any sediment effects from the culvert installations.	None

Table 3-55: Summary of cumulative effects to aquatic fauna and habitat in Alternative 2. Effects are described in the column titled "Extent, Detectable?" (Continued)

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species and Stream Habitat Effects
		Time	Space			
Sunrise and Hood River Meadows Parking Lot Use and Maintenance, including snow removal	Stream Temperature	Yes	Yes	No	None of the proposed projects would alter the primary shade zone thus water temperature would not be affected.	None
	Suspended and Bedload Sediment	Yes	Yes	Yes	There would be an overlap in timing of effects with this project and the Mt. Hood Meadows Parking Lot Improvements Project. Since the new maintenance shop would be located on an extension of the existing Sunrise Parking Lot footprint, activities associated with vehicle traction and snow management would have the potential to add more sediment into Mitchell Creek. The amount would be minimized due to implementation of PDC and conformance with existing standards and guidelines in both projects.	Increase in potential impacts to aquatic macroinvertebrates, including the Scott's Apatanian caddisfly. The increase in sediment could hinder insect respiration, smother food sources (detritus), and/or cause emigration out of the area.
	Chemical Contaminants	Yes	Yes	No	There would be an overlap in timing of effects with this project and the Mt. Hood Meadows Parking Lot Improvements Project. Since the new maintenance shop would be located on an extension of the existing Sunrise Parking Lot footprint, runoff containing chemical contaminants from the maintenance shop would have the potential to add to similar contaminants that are currently originating from the existing Sunrise Parking Lot. The total amount of contaminants ultimately reaching Mitchell Creek would be minimized due to implementation of PDC and conformance with existing standards and guidelines in both projects.	None

Table 3-55: Summary of cumulative effects to aquatic fauna and habitat in Alternative 2. Effects are described in the column titled "Extent, Detectable?" (Continued)

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species and Stream Habitat Effects
		Time	Space			
ODOT sand shed operation and maintenance	Suspended and Bedload Sediment	Yes	Yes	No	Storage of sanding material and ingress and egress of sanding trucks increases risk that some sand could wash from storage area and/or moving trucks into Meadows Creek and the wetland near the right-turn lane. Risk quite small given proximity to Meadows Creek and the wetland. The location of Highway 35 and Forest Service Road 3545 between shed and Meadows Creek – routing sediment away from creek – is another factor of safety reducing potential sediment into creek	None
Highway 35, Forest Service Road 3555 and 3545 sanding	Suspended and Bedload Sediment	Yes	Yes	Some sediment increase possible but likely not measurable against sanding material background	Applying traction sand on roads could potentially increase delivery of bedload and suspended sediment to adjacent surface water. This material could mix with eroded soil from the Mt. Hood Meadows Parking Lot Improvements EIS project. The project most likely to have a potential for a cumulative effect is construction of the left- and right-turn lanes. Some sediment would enter Meadows Creek from the left-turn lane construction area but the amount would be minor and localized near the Highway. This addition of sediment would only occur for a short period following construction, one year or less. Until the cut slope above the new wetland stabilizes and is re-vegetated some erosion could occur resulting in sedimentation into the new wetland that would add to Highway 35 surface sanding material. The amount would be minor and not enough to fill the wetland.	Slight increase in potential impacts to aquatic macroinvertebrates and, to a much lesser extent, cutthroat trout. The increase in sediment could hinder insect respiration, smother food sources (detritus), and/or cause emigration out of the area. The impact to cutthroat trout, if an, would depend on the impact to insects as described above in the indirect effects section.

New Nordic Trails (Alternative 3)

Direct Effects

The potential for direct effects to aquatic organisms/habitat is the same as Alternative 2 (Table 3-54) despite differences in terms of Nordic trail locations and the Sunrise Vehicle Maintenance Shop location. The majority of proposed activities are outside Riparian Reserves and those located in a Riparian Reserve, except the turn lanes, are far enough from surface water that construction disturbance would not occur.

Indirect Effects

The overall acres of impact (tree clearing, grading, paving, etc.) for proposed activities are larger than Alternative 2, totaling about 24.7 acres. As in Alternative 2, much of that is the Twilight Parking Lot with the associated access road and maintenance yard (17.5 acres). This alternative has the most Riparian Reserve disturbance of all alternatives (4.8 acres; Table 3-35). Disturbance areas in Riparian Reserves include portions of the Twilight Parking Lot access road and maintenance shop, left- and right-turn lanes, and the Sunrise Vehicle Maintenance Shop. The potential Riparian Reserve disturbance associated with the latter project is relatively large (1.5 acres), although the turn lanes still impact the most Riparian Reserve area (2.9 acres).

Stream Shade/Water Temperature

Some of the trees and willows located east of the Mitchell Creek tributary would be removed, and as such, shading would be reduced primarily during morning hours. This reduction in shade increases the risk that water temperature in the tributary could be increased. The magnitude of that increase is unknown but would be localized (see Water Quality Specialist Report). Given the elevation and existing cold water the biological impacts to macroinvertebrates would be discountable. Water temperature in Mitchell Creek would not be affected because the tributary becomes subsurface flow before entering Mitchell Creek and the water would become colder while underground. Impacts to shade producing vegetation from other Alternative 3 proposed activities would be the same as described above for Alternative 2 - shade reductions that could result in water temperature increases are not expected.

Sediment/Turbidity

Potential indirect effects associated with proposed activities in this alternative center around increased stream sedimentation and/or turbidity in the Mitchell Creek tributary and Meadows Creek. Potential impacts to Meadows Creek and wetland from the left- and right-turn lanes are the same as described for Alternative 2.

Possible increases of fine sediment into the Mitchell Creek tributary is due to the proximity of the Sunrise Vehicle Maintenance Shop and associated disturbed area in relation to the stream. A large amount of fill would be brought to the site to create a level area for the shop buildings and associated parking. This fill would extend south and east from the existing administration building area and encroach into the wetland meadow adjacent to the tributary. Based on the design plans, the bottom of the new fill slope is within 15-feet of the stream at its closest point and would be well within 50 feet of the stream along much of the fill slope length.

Although erosion control measures would be implemented as described in the PDC, it would be difficult to completely ensure no increase in sedimentation given the proximity to the creek. Some, perhaps all, of the sedimentation could occur during construction as the limit of

disturbance (i.e. where equipment may need to operate) lies adjacent to the stream in a few areas. During this phase of the construction, it is possible some sediment would enter the tributary; however, it is not anticipated that construction equipment would need to operate in the tributary itself.

It is also anticipated that snow plowing and movement at the maintenance shop would result in some road sanding sediment entering the tributary. The amount would be minimal given the fact that stormwater management would be incorporated into the design. As described in the Water Quality Specialist Report, however, the proximity of the maintenance shop to the stream would make it difficult to keep all the material out.

The fate of this sediment is essentially the same as described above for Mitchell and Meadows Creeks in Alternative 2. The finer sediment material (sand/silt) would be transported downstream and deposited in slower water areas. Any that travelled all the way to the Sunrise Parking Lot would be deposited in the man-made wetland. Larger substrate (gravel, nothing larger than this would likely enter the stream) would tend to stay near its entrance point in the stream although some would slowly be moved downstream.

The potential effect of the sediment on aquatic macroinvertebrates and habitat is also similar to that described above for Mitchell Creek in Alternative 2. In localized areas, especially adjacent to the Sunrise Vehicle Maintenance Shop, the sediment could smother aquatic invertebrates, cause them to migrate downstream, and/or affect their food source (detritus). Impacts from the maintenance shop construction would only last as long it took the area to stabilize and is somewhat dependent on precipitation events. Snow plowing and movement at the site could result in a chronic, albeit minimal, amount of sedimentation into the creek. If macroinvertebrates were forced to move downstream during and immediately following construction, the area would be re-colonized by upstream populations.

Water Quality/Chemical Contamination

For all proposed projects in this alternative, except the Sunrise Vehicle Maintenance Shop, there would be no impact to water quality for the same reasons given for Alternative 2. None of the proposed differences in parking lot design and other infrastructure would change proximity to Riparian Reserves and/or hydrologic connectivity.

The location of the Sunrise Vehicle Maintenance Shop in this alternative is adjacent to the Mitchell Creek tributary and in some places the maintenance area would be within 25-feet of the creek itself. PDC are designed to eliminate the chance for spills and aquatic contamination during construction. However as described above, the very nature of activity carried out in the maintenance area leads to an increased risk for a spill of petrochemicals and the proximity of the maintenance shop to the stream greatly increases the chance chemicals could enter surface water.

Although a stormwater management system would be incorporated into the maintenance shop, it is unclear whether it could route all runoff, including pollutants, completely away from the Mitchell Creek tributary. Even if the surface water was not contaminated directly some of the runoff would seep into the soil and over time it is a higher probability that some chemicals could eventually end up in the creek. This would depend on the chemicals spilled, amount spilled, effectiveness and design of the stormwater management system, and length of time the chemical persists in the environment either above or below the soil surface. The risk of chemicals reaching

the creek is higher in this location than compared to the location proposed in Alternative 2. The increased risk is due to proximity to the creek and the smaller size of the stormwater management system.

It is impossible to predict how much of any given chemical could enter the creek. The chance for gasoline, which is highly toxic, to enter the creek is still quite low due to its volatility and rapid evaporation. The risk that some components of diesel fuel could reach the creek is also quite low, although somewhat higher than gasoline.

Cumulative Effects

Water quality cumulative effects that could lead to impacts to aquatic species or habitat in Alternative 3 would be the same as those described for Alternative 2 (Table 3-55) with one exception related to the new maintenance shop location (Table 3-56). Given the proximity of the proposed maintenance shop next to a small perennial stream it is likely that the daily operation and maintenance of the shop after construction would result in some increase in chemical additions to the stream with possible localized effects to aquatic macroinvertebrates.

Table 3-56: Summary of cumulative effects to aquatic fauna and habitat associated with those aspects of Alternative 3 that differ from Alternative 2, i.e. the Sunrise Vehicle Maintenance Shop location. Effects are described in the column titled "Extent, Detectable?"

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species and Stream Habitat Effects
		Time	Space			
Sunrise Parking Lot Use and Maintenance, including snow removal	Stream Temperature	Yes	No	No	Shade producing trees were removed along approximately 300' of Mitchell Creek when the Sunrise Parking Lot was constructed. Although some increase in water temperature is expected in the Mitchell Creek tributary due to tree removal associated with the proposed maintenance shop, it would not affect Mitchell Creek since the stream goes subsurface prior to joining Mitchell Creek	No impact in Mitchell Creek.
	Suspended and Bedload Sediment	Yes	No	No	Snow plowing and removal activities as well as sanding and subsequent runoff during snowmelt would result in an overlap in time with the new maintenance shop. However, since the new maintenance shop would be located on a tributary that flows subsurface before entering Mitchell Creek, sediment associated with vehicle traction and snow management at the new shop would not mix with any sediment produced in Mitchell Creek from the Sunrise Lot.	No impact in Mitchell Creek.
	Chemical Contaminants	Yes	No	No	Sunrise Parking Lot use and Maintenance shop use would overlap in time. Because the new maintenance shop would be located on a tributary that flows subsurface before entering Mitchell Creek, any chemical contaminants associated with runoff from the new shop would not reach Mitchell Creek downstream. As discussed in the effects section, the total amount of contaminants would be very low due to implementation of PDC and conformance with existing standards and guidelines in both projects.	No impact in Mitchell Creek

Table 3-56: Summary of cumulative effects to aquatic fauna and habitat associated with those aspects of Alternative 3 that differ from Alternative 2, i.e. the Sunrise Vehicle Maintenance Shop location. Effects are described in the column titled "Extent, Detectable?" (Continued)

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species and Stream Habitat Effects
		Time	Space			
MHM administrative building operation and maintenance	Suspended and Bedload Sediment	Yes	Yes	No	Removal of snow from this area plus runoff could result in some additional sediment routed into the unnamed tributary to Mitchell Creek. Amount would be immeasurable because the majority of snow at the Administration building is plowed towards the parking lot to the north, away from the unnamed tributary.	None
	Chemical Contaminants	Yes	Yes	Yes	Anticipated that some existing use, including vehicle maintenance, would continue at Administration building which would be adjacent to new vehicle maintenance shop as proposed in this alternative. This use increases risk of additional petrochemicals entering wetland and possibly stream.	Some localized impacts to aquatic insects possible that could affect survival. Chemicals would dissipate further downstream, no effects in Mitchell Creek

Elk Meadow Master Plan (Alternative 4)

Direct Effects

The potential for direct effects to aquatic organisms/habitat is the same as Alternative 2 (Table 3-54) despite differences in terms of proposed Twilight Parking Lot and other infrastructure locations. Excepting the left- and right-turn lanes, the majority of proposed activities are outside Riparian Reserves (Table 3-35) and those located in a Riparian Reserve are far enough from surface water that construction disturbance would not occur.

Indirect Effects

The overall acres of impact (tree clearing, grading, paving, etc.) for proposed activities are the least of all alternatives, totaling about 11.6 acres. Approximately 80 percent of this is the Twilight Parking Lot with the associated access road and maintenance yard. Potential disturbance in Riparian Reserves is slightly less than Alternative 3 (4.2 acres), but the Twilight Parking Lot encroaches into Riparian Reserves more than in Alternatives 2 and 3 (Table 3-35).

Stream Shade/Water Temperature

Potential impacts to shade and subsequently water temperature are the same as described for Alternative 2. Different locations of some infrastructure, such as the Twilight Parking Lot and Sunrise Vehicle Maintenance Shop, would not impact stream shade as no shade producing vegetation would be removed.

Sediment/Turbidity

Although some infrastructure locations and sizes are different, the potential effects from a sediment perspective are the same as described for Alternative 2. The Sunrise Vehicle Maintenance Shop proposed location is on a knoll between Forest Road 3555 and the Sunrise Parking Lot and except for 0.1 acres is completely outside Riparian Reserves. PDC would ensure the small wetland located on the knoll is not impacted by increased sediment. The new locations of the Twilight Parking Lot and associated access and maintenance areas are still on the opposite side of Forest Service Road 3545 from Meadows Creek and the same rationale as described above applies here. The rerouted hiking trail and Nordic ski trails do not lie within any Riparian Reserve.

Water Quality/Chemical Contamination

The potential impacts from proposed activities in this alternative are the same as described in Alternative 2. New project locations for some infrastructure would not result in more or closer activity within Riparian Reserves or near streams.

Cumulative Effects

Similar to Alternative 3, water quality cumulative effects that could lead to impacts to aquatic species or habitat in Alternative 4 would be the same as those described for Alternative 2 (Table 3-55) with one exception related to the new maintenance shop location (Table 3-57). The location of the maintenance shop on the knoll between the Sunrise Parking Lot and Forest Service Road 3555 would result in no potential cumulative effect of any kind in Mitchell Creek.

Table 3-57: Summary of cumulative effects to aquatic fauna and habitat associated with those aspects of Alternative 4 that differ from Alternative 2, i.e. the Sunrise Vehicle Maintenance Shop location. Effects are described in the column titled "Extent, Detectable?"

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species and Stream Habitat Effects
		Time	Space			
Sunrise Parking Lot Use and Maintenance, including snow removal	Stream Temperature	Yes	Yes	No	The location of the Sunrise Vehicle Maintenance Shop in this alternative would not result in the removal of any stream side shade thus no water temperature cumulative effect in Mitchell Creek would occur.	None
	Suspended and Bedload Sediment	Yes	Yes	No	There may be an overlap in timing of this project with the Mt. Hood Meadows Parking Lot Improvement Project; any minor suspended sediment would not be measurable due to implementation of PDC and conformance with existing standards and guidelines in both projects.	None
	Chemical Contaminants	Yes	Yes	No	There may be an overlap in timing of this project with the Mt. Hood Meadows Parking Lot Improvement Project; any minor chemical contaminants would not be measurable due to implementation of PDC and conformance with existing standards and guidelines in both projects.	None

Elk Meadow (Alternative 5)

Direct Effects

The potential for direct effects to aquatic organisms/habitat is the same as the previously described for Alternative 2 (Table 3-54) despite differences in terms of proposed Twilight Parking Lot and other infrastructure locations. Most proposed activities are outside Riparian Reserves and those located in a Riparian Reserve (except the left- and right-turn lanes) are far enough from surface water that construction disturbance would not occur.

Indirect Effects

The overall acres of impact (tree clearing, grading, paving, etc.) for proposed activities are the same as Alternative 2, totaling 18.1 acres, but the Twilight Parking Lot and associated access roads are larger and new Nordic ski trails are much smaller due to the different parking lot location. . Potential disturbance in Riparian Reserves is the same as in Alternative 4, totaling 4.2 acres (Table 3-35). The proposed Sunrise Vehicle maintenance shop footprint has very little area in a Riparian

Reserve, but the Twilight Parking Lot and associated infrastructure has a similar footprint in the Meadows Creek Riparian Reserve as in Alternative 4.

Stream Shade/Water Temperature

Potential impacts to shade and subsequently water temperature are the same as described for Alternative 2. None of the proposed activities would result in vegetation removal that would reduce stream shade.

Sediment/Turbidity

The location of the Twilight Parking Lot and associated access road and maintenance areas are on the opposite side of Forest Service Road 3545 from Meadows Creek and the same rationale relating to sedimentation described above applies here. A small portion of a rerouted Nordic ski trail lies within a wetland Riparian Reserve north of Forest Service Road 3545. PDC would ensure that sedimentation would not increase in the wetland. The proposed location of the Sunrise Vehicle Maintenance Shop is the same as in Alternative 4 and anticipated effects are also the same as previously described.

Water Quality/Chemical Contamination

There are no potential impacts to water quality from proposed activities in this alternative, as described in Alternative 2.

Cumulative Effects

As described above the potential effects associated with this alternative are similar to those described for Alternative 2 and, in regards to the Sunrise Vehicle maintenance shop, Alternative 4. Therefore, cumulative effects for this alternative are as described for Alternatives 2 and 4 (Tables 3-55 and 3-57).

Preferred Alternative (Alternative 6)

Direct Effects

The potential for direct effects to aquatic organisms/habitat is the same as described for Alternative 2 (Table 3-54). Except for the left- and right-turn lanes, the majority of proposed activities are outside Riparian Reserves (Table 3-35) and those located in a Riparian Reserve are far enough from surface water that construction disturbance would not occur.

Indirect Effects

The overall acres of impact (tree clearing, grading, paving, etc.) for proposed activities are slightly higher than Alternatives 2 and 5, totaling about 19.5 acres. Most of the proposed infrastructure in this alternative is the same as Alternative 2 except Nordic trails are the same as Alternative 3 and the Sunrise Vehicle Maintenance Shop is as proposed in Alternative 4. Potential disturbance in Riparian Reserves is essentially the same as Alternative 2 (3.8 acres).

Stream Shade/Water Temperature

Potential impacts to shade and subsequently water temperature are the same as described for Alternative 2. Different locations of some infrastructure, such as the Nordic trails and Sunrise Vehicle Maintenance Shop, would not impact stream shade as no shade producing vegetation would be removed.

Sediment/Turbidity

The potential effects from a sediment perspective are the same as described for Alternative 2 for most project elements and as described in Alternative 4 for the Sunrise Vehicle Maintenance Shop The rerouted hiking trail and Nordic ski trails do not lay within any Riparian Reserve.

Water Quality/Chemical Contamination

The potential impacts from proposed activities in this alternative are the same as described in Alternative 2. New project locations for some infrastructure would not result in more or closer activity within Riparian Reserves or near streams.

Cumulative Effects

The potential cumulative effects associated with this alternative are similar to those described for Alternative 2 and, in regards to the Sunrise Vehicle maintenance shop, Alternative 4. Therefore, cumulative effects for this alternative are as described for Alternatives 2 and 4 (Tables 3-55 and 3-57).

3.5.5 Determination of Effect Including Essential Fish Habitat

The only PETS aquatic species potentially affected by proposed project activities is the Scott's Apatanian caddisfly (Table 3-58). Potential effects center on potential disturbance and increased sedimentation resulting from left- and right-turn lanes construction in all action alternatives and potential increases in sedimentation from the Sunrise Vehicle Maintenance Shop in Alternatives 2 and 3, and possibly chemical contamination as outlined in Alternative 3.

The construction of the left- and right-turn lanes would result in some direct disturbance to cutthroat trout, an MIS species, and increased amounts of fine sediment into Meadows Creek are likely. However, this increase in fine sediment would not impact cutthroat trout survival or reproductive success. Lower Columbia River steelhead trout designated spawning and rearing critical habitat in Meadows Creek is unoccupied but does extend up to Highway 35. The increased fine sediment expected from the left-turn lane construction would not measurably diminish the quality or quantity of spawning and rearing habitat for steelhead trout; therefore, this action would not result in the destruction or adverse modification of steelhead critical habitat. There is no adverse effect to Essential Fish Habitat as it is not present in the affected environment.

Cutthroat trout may also be impacted by the left-turn lane construction due to potential increases in fine sediment. However, because this project potentially impacts less than 0.06% of occupied cutthroat trout habitat across the forest, the overall direct, indirect and cumulative effects would result in a small, localized negative trend to habitat. The habitat degradation would be insignificant at the forest scale and therefore the EIS is consistent with the Forest Plan. The action alternatives **may impact individuals or habitat, but would not threaten species viability.**

3.5.6 Summary of Effects by Action Alternative

The following summary outlines the primary anticipated effects on aquatic species and habitat for the action alternatives. Since there is a great deal of similarity and overlap in terms of effects between alternatives, the discussion is grouped by proposed activity and/or project area.

The left- and right-turn lanes proposal is the same for all action alternatives. Potential impacts are an increased risk of direct effects to cutthroat trout and Scott's Apatanian caddisfly due to disturbance during construction activities and then small, short-term increases in fine sediment to Meadows Creek and potentially the relocated wetland adjacent to Highway 35. Although localized effects are anticipated, Forest Plan standards and guidelines would be met in regards to MIS species as well as habitat conditions. The small amount of sediment expected would not degrade pool habitat (FW-088) nor measurably increase the amount of fine sediment in spawning habitat (FW-097). Other habitat parameters would be unaffected.

There would be no impact to Meadows Creek regardless of the action alternative from the proposed Twilight Parking Lot (and associated access road and maintenance area), Nordic ski trails, utility lines, or Sahalie Falls Trail re-route due to the location of the proposed infrastructure and PDC. The slight overlap with Riparian Reserves in some alternatives would not impair stream or floodplain function. All applicable standards and guidelines would be met.

The Sunrise Vehicle Maintenance Shop would have a slight impact on Mitchell Creek due to increased sedimentation in Alternative 2. The impacts would be localized and Forest Plan standards and guidelines would be met and spawning and rearing habitat would not be measurably affected. There would be no impact to aquatic species or habitat in Alternatives 4, 5, and 6 due to the proposed location of the shop and PDC. In Alternative 3, the Sunrise Vehicle Maintenance Shop could impact the unnamed tributary to Mitchell Creek from a shade, sediment, and possibly chemical contaminant perspective. However, it is anticipated that water temperatures would not exceed standard FW-110 due to the small amount of shade removed and elevation of the stream. Although localized impacts to aquatic macroinvertebrates could occur, the amount of sediment would not measurably impact stream habitat, thus meeting Forest Plan standards. The risk of chemical contamination is increased due to the proximity of the maintenance shop to the stream. PDC are designed to prevent this, but it is possible that some impacts to aquatic macroinvertebrates could occur.

Table 3-58: List of federally threatened and R6 sensitive fish and aquatic macroinvertebrate species found on the Mt. Hood National Forest and addressed in this Biological Evaluation.

	Listing & Critical Habitat Date	Suitable Habitat Present	Species Present	Effects of Actions					
Endangered Species Act Listing by ESU/DPS – All Threatened				**Alt. 1**	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**	**Alt. 6**
Lower Columbia River steelhead & CH (*Oncorhynchus mykiss*)	1/06 9/05	Y	N	NE	NE[1] NAM	NE NAM	NE NAM	NE NAM	NE NAM
Lower Columbia River chinook & CH (*Oncorhynchus tshawytscha*)	6/05 9/05	N	N	NE	NE	NE	NE	NE	NE
Columbia River Bull Trout & CH (*Salvelinus confluentus*)	6/98 11/10	N	N	NE	NE	NE	NE	NE	NE
Middle Columbia River steelhead & CH (*Oncorhynchus mykiss*)	1/06 9/05	N	N	NE	NE	NE	NE	NE	NE
Upper Willamette River chinook & CH (*Oncorhynchus tshawytscha*)	6/05 9/05	N	N	NE	NE	NE	NE	NE	NE
Lower Columbia River coho & CH[2] (*Oncorhynchus kisutch*)	6/05 1/13	N	N	NE	NE	NE	NE	NE	NE
Forest Service Region 6 Regional Forester's Sensitive Species									
Barren Juga (*Juga hemphilli hemphilli*)	1/08	N	N	NI	NI	NI	NI	NI	NI
Purple-lipped Juga (*Juga hemphilli maupinensis*)	1/08	N	N	NI	NI	NI	NI	NI	NI
Dalles Juga (*Juga hemphilli dallesensis*)	12/11	N	N	NI	NI	NI	NI	NI	NI
Scott's Apatanian Caddisfly (*Allomyia scotti*)	1/08	Y	Y	NI	MIIH	MIIH	MIIH	MIIH	MIIH
Caddisfly (*Namamyia plutonis*)	12/11	N	N	NI	NI	NI	NI	NI	NI

Acronyms:

CH – Critical Habitat	NE - No Effect	NI – No Impact	NAM – Not adversely modify
MIIH - May impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species			

[1]. No effect on steelhead trout individuals, no adverse modification on steelhead critical habitat
[2]. Critical habitat for this species was recently proposed for designation by the NMFS.

3.5.7 Consistency Determination

No federally listed aquatic species are known to reside in the affected environment; however, designated, but unoccupied, critical spawning and rearing habitat for Lower Columbia River steelhead trout does lie within the affected environment. Potential effects to critical habitat were assessed using the best available information and science and thus meet the intent of the Endangered Species Act. Since the construction of the Highway 35 left-turn lane would not result in the destruction or adverse modification of critical habitat further consultation/coordination

with NOAA Fisheries is not required. Because bull trout and bull trout critical habitat are not present in the affected environment coordination with U.S. Fish and Wildlife Service is not required.

There are no fish/aquatic organism specific Federal, state, and county laws, regulations, or policy that would affect any of the proposed projects (although MHM would need to obtain necessary removal/fill permits from Oregon Division of State Lands and the Corps of Engineers).

All proposed activities regardless of alternative comply with applicable aquatic direction, recommendations, and/or standards and guidelines outlined in the following plans:

- Mt. Hood National Forest Land and Resource Management Plan
- Northwest Forest Plan (1994)
- Survey and Manage ROD (2001)
- MHM Ski Area Master Plan
- East and Middle Forks Hood River Watershed Analysis

3.5.8 Incomplete and Unavailable Information

Specific information regarding cutthroat trout population size and production in Meadows Creek is unavailable. Other habitat quality and quantity and aquatic macroinvertebrate presence/absence surveys are the latest available, but are somewhat dated. However, the available survey data plus the scientific literature gives enough information for a complete analysis for the following reasons.

- Past surveys were completed by trained professionals and thus the survey quality is good.
- Fish and aquatic macroinvertebrate distribution does not change significantly over time unless habitat conditions change that lead to an unsuitable environment. There have been no significant changes in water and habitat quality/quantity in the affected environment since surveys were conducted.
- Streams within the affected environment are small and stable and thus habitat conditions remain similar over time. No large scale flood events or other major disturbances have occurred since habitat surveys were conducted.
- Inferences from the scientific literature regarding fish and aquatic macroinvertebrate response to habitat disturbance are appropriate even when specific studies have not been conducted in the area analyzed. Responses to increased sedimentation, for example, are well documented and relationships are well established.

3.6 Aquatic Conservation Strategy

In order for a project to proceed, "a decision maker must find that the proposed management activity is consistent with the Aquatic Conservation Strategy objectives" (ROD B-10) from the Northwest Forest Plan Record of Decision. The nine objectives are listed on page B-11 of the ROD. Portions of the effects analysis in this document focus on key parameters or indicators that make up elements of the nine Aquatic Conservation Strategy objectives, to determine if the project would restore, maintain, or degrade these indicators. Once this determination is made, the indicators are examined together with the Range of Natural Variability to ascertain whether the project is consistent with the objectives. A description of the range of natural variability of the "important physical and biological components" (ROD B-10) is necessary for determining whether a project "meets" or "does not prevent attainment" of the Aquatic Conservation Strategy

objectives (ROD B-10). Relevant portions of the range of natural variability from the Watershed Analysis are included in the Existing Conditions section of this report. In general, natural sediment loads are high in this area and sediment tends to move unevenly, in pulses through the aquatic system. Recent debris flow activity in White River, Clark and Newton Creeks are an example of the high natural sediment load in this area.

The following table displays specific indicators that comprise the Aquatic Conservation Strategy (ACS) objectives and the effects section that covers this indicator in the EIS.

Table 3-59: ACS Objective Indicators in the EIS

Indicators	Analysis Found in the Effects Section of the EIS
Water Temperature	Water Quality
Sediment	Soil Productivity, Water Quality, Fisheries and Aquatic Fauna
Chemical Contamination	Water Quality, Fisheries and Aquatic Fauna
Physical Barriers	Water Quality, Fisheries and Aquatic Fauna
Substrate	Fisheries and Aquatic Fauna
Large Woody Debris	Fisheries and Aquatic Fauna
Pool Frequency	Fisheries and Aquatic Fauna
Pool Quality	Fisheries and Aquatic Fauna
Off-Channel Habitat	Fisheries and Aquatic Fauna
Refugia	Fisheries and Aquatic Fauna
Width/Depth Ratio	Fisheries and Aquatic Fauna
Streambank Condition	Water Quality, Fisheries and Aquatic Fauna
Floodplain Connectivity	Water Quality, Fisheries and Aquatic Fauna
Peak/base Flows	Water Quality
Drainage Network Increase	Water Quality
Riparian Reserves	Water Quality, Fisheries and Aquatic Fauna

The following table displays the individual indicators and the effect the alternatives have on those indicators at the 5th, 6th and 7th field watershed scale. Fifth field watersheds are generally large in size (40,000 acres to 250,000 acres), while 6th and 7th field watersheds are smaller (5,000 acres to 40,000 acres and 2,000 acres to 5,000 acres respectively).

Table 3-60: ACS Objective Indicators for each Alternative The abbreviations in the table are defined as: R="Restore" which means the action(s) would result in acceleration of the recovery rate of that indicator; M="Maintain" which means that the function of an indicator does not change by implementing the action(s) or recovery would continue at its current rate; and, D="Degrade" which means changing the function of an indicator for the worse.

Indicators	Effects of the Actions by Alternative					
	1	2	3	4	5	6
Water Quality: Temperature	M	M	D (Slight)	M	M	M
Sediment	M	M	M	M	M	M
Chemical Contamination	M	M	D (Slight)	M	M	M
Habitat Access: Physical Barriers	M	M	M	M	M	M
Habitat Elements: Substrate	M	M	M	M	M	M
Large Woody Debris	M	M	D (Slight)	M	M	M
Pool Frequency	M	M	M	M	M	M
Pool Quality	M	M	M	M	M	M
Off-channel Habitat	M	M	M	M	M	M
Refugia	M	M	M	M	M	M
Channel Conditions and Dynamics: Width/Depth Ratio	M	M	M	M	M	M
Streambank Condition	M	M	M	M	M	M
Floodplain Connectivity	M	M	M	M	M	M
Flow/Hydrology: Peak/Base Flows	M	M	M	M	M	M
Drainage Network Increase	M	M	M	M	M	M
Watershed Conditions: Riparian Reserves	M	M	D (Slight)	M	M	M

The following summarizes the Individual Indicator Table and associated ACS Objectives:

- Water Temperature, Large Woody Debris and Riparian Reserves would be slightly degraded in Alternative 3. This is due to vegetation removal associated with the new Sunrise Vehicle Maintenance Shop. Degrading these indicators would have some influence on all of the ACS Objectives except ACS Objective 7 – Maintain the Timing, Variability, and Duration of Floodplain Inundation. As described in the effects section, this degradation would be at the site level and these conditions would be "Maintained" at the 7th field subwatershed and larger scale. Some sediment may be introduced in Alternatives 2 and 3 due to traction gravel and snow management. Additionally, some sediment may be introduced in all alternatives due to construction of the left-turn lane on Highway 35. The amounts would be very small and within the range of natural variability which describes natural sediment loads as "high" in this watershed.

- Indicators other than those described in the bullet above would be maintained as outlined in the effects analysis above.

3.7 Wildlife

More information is available in the project record including the full wildlife analysis file, and biological evaluation as part of the Wildlife Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.7.1 Introduction

It is Forest Service policy to protect the habitat of federally listed and sensitive species from adverse modification or destruction, as well as to protect individual organisms from harm or harassment as appropriate (FSM 2670.3). All Forest Service projects, programs, and activities are to be reviewed for possible effects on threatened, endangered, and sensitive species and the findings documented in a decision notice.

The analysis area is the Mount Hood Meadows Ski Resort Permit Area (MHM Permit Area). The project area encompasses all areas within the analysis area that will have project actions taking place. Larger scale analysis was done at the 5th field watershed for snag and down wood by using DecAid.

3.7.2 Existing Conditions

Two species of wildlife classified as threatened, endangered or proposed for listing may be found on or adjacent to the Hood River Ranger District on the Mt. Hood National Forest (the Forest). There are seventeen Forest Service Region 6 sensitive species (December, 2011), seven other Survey and Manage species, and seven Management Indicator Species (MIS) that may also be found on the District (Table 3-61).

Table 3-61: Survey Results of threatened, endangered, and proposed species; Forest Service Region 6 sensitive species; Survey and Manage species; and Management Indicator Species in the project area (includes surveys completed for previous projects).

WILDLIFE SURVEY RESULTS		
Species	**Habitat**	**Presence**
Federally Threatened, Endangered or Proposed		
Northern spotted owl (*Strix occidentalis caurina*)	Y	Y
Canada lynx (*Lynx canadensis*)	N	-
R6 Sensitive Species		
Bald eagle (*Haliatus leucocephalus*)	N	-
Cope's giant salamander (*Dicomptodon copei*)	N	-
Cascade torrent salamander (*Rhyocotriton cascadae*)	N	-
Oregon spotted frog (*Rana pretiosa*)	N	-
Painted turtle (*Chrysemys picta*)	N	-

Table 3-61: Survey Results of threatened, endangered, and proposed species; Forest Service Region 6 sensitive species; Survey and Manage species; and Management Indicator Species in the project area (includes surveys completed for previous projects). (Continued)

WILDLIFE SURVEY RESULTS		
Species	**Habitat**	**Presence**
Northwestern pond turtle (*Clemmys marmorata marmorata*)	N	-
Baird's shrew (*Sorex bairdii permiliensis*)	N	-
Pacific fringe-tailed bat (*Myotis thysanodes vespertinus*)	N	-
Wolverine (*Gulo gulo luteus*)	Y	N
Pacific fisher (*Martes pennanti*)	N	-
Horned grebe (*Podiceps auritus*)	N	-
Bufflehead (*Bucephala albeola*)	N	-
Harlequin duck (*Histrionicus histrionicus*)	N	-
Gray flycatcher (*Empidonax wrightii*)	N	-
Peregrine falcon (*Falco peregrinus anatum*)	Y	Y
Johnson's hairstreak (*Callophyrs johnsoni*)	N	-
Mardon skipper (*Polites mardon*)	N	-
Survey and Manage		
Great gray owl (*Strix nebulosa*)	Y	N
Larch Mountain salamander (*Plethodon larselii*)	N	-
Dalles sideband (*Monadenia fidelis minor*)	N	-
Crater Lake tightcoil (*Pristiloma arcticum crateris*)	N	-
Evening fieldslug (*Deroceras hesperium*)	N	-
Puget Oregonian (*Cryptomastix devia*)	N	-
Columbia Oregonian (*Cryptomastix hendersoni*)	N	-
Management Indicator Species		
Mule Deer (*Odocoileus hemionus*) and Elk (*Cervus elaphus nelsoni*)	Y	Y
Pileated Woodpecker (*Dryocopus pileatus*)	Y	Y
Pine Marten (*Martes americana*)	Y	Y
Wild Turkey (*Meleagris gallopavo*)	N	-
Western Gray Squirrel (*Sciurus griseus griseus*)	N	-
Other Species		
Snag and Down Log Associated Species	Y	Y
Neotropical Migratory Birds	Y	Y

Species that are listed as "N" for Habitat in Table 3-61 do not occur within the project area or would not be impacted by this project and will not be discussed further in this analysis. Surveys were completed for survey and manage species in accordance with the 2001 Survey and Manage ROD (Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and Other Mitigation Measures Standards and Guidelines) for the project.

During field surveys, a mollusk (*Deroceras* spp.) was found in close proximity to the proposed Sunrise Vehicle Maintenance Shop for Alternative 3. Genetic testing is required to confirm what species was found. Based on the wetland where the species was found, it is expected, based on professional judgment, to be a Meadows fieldslug which is a common species that adapts to many habitats. If the mollusk is discovered to be the survey and manage species, Evening fieldslug (*Deroceras hesperium*) all management direction from the 2001 Survey and Manage Record of Decision (ROD) will be followed. The required buffers for this species is 30 meters (approximately 98 feet), this would put the buffer line into the proposed maintenance building footprint making the Sunrise Vehicle Maintenance Shop for Alternative 3 infeasible. If it is discovered that this species is Evening fieldslug (Category B, Survey and Manage species), this alternative shall not be implemented as required by the Survey and Manage ROD. The ROD requires all known sites to be managed in order to protect the species (ROD, page 9-10). If it is discovered that this species is the common mollusk, Alternative 3 remains a viable alternative. If the results from the genetic testing have not determined the species when the decision is made for this project, it will be assumed that the mollusk is a Survey and Manage species and Alternative 3 shall not be selected by the Responsible Official.

Threatened, endangered and proposed species (Northern spotted owl)

The northern spotted owl (spotted owl) is listed as a threatened species under the Endangered Species Act and is a Management Indicator Species under the Mt. Hood Land and Resource Management Plan (Forest Plan).

Habitat

Spotted owls generally depend on older forested habitats that contain the structures and characteristics required for nesting, roosting, foraging, and dispersal. These characteristics of older forests include a multi-layered, multi-species canopy dominated by large overstory trees; moderate to high canopy closure; a high incidence of trees with large cavities and other types of deformities; numerous large snags; an abundance of large, dead wood on the ground; and open space within and below the upper canopy for spotted owls to fly (Thomas et al. 1990). Forested stands with high canopy closure also provide thermal cover, as well as protection from predation.

Generally, suitable habitat is 80 years of age or older; canopy cover exceeds 60 percent; canopy cover is multi-storied; and sufficient snags and down wood are present to provide opportunities for nesting, roosting and foraging. Dispersal habitat for the owl usually consists of mid-seral stage stands between 40 and 80 years of age with a canopy closure of 40 percent or greater and an average diameter of 11-inches. Spotted owls use dispersal habitat to move between blocks of suitable habitat and juveniles use it to disperse from natal territories. Dispersal habitat may have roosting and foraging components, enabling spotted owls to survive, but lack structure suitable for nesting. Recent landscape-level analyses suggest that a mosaic of late-successional habitat interspersed with other vegetation types may benefit spotted owls more than large, homogeneous expanses of older forests (Zabel et al. 2003).

Snags and down woody debris are an important component of spotted owl habitat. Spotted owls are mostly nocturnal, but they may forage opportunistically during the day. Composition of

prey in the spotted owl's diet varies regionally, seasonally, annually, and locally, which is likely in response to prey availability (Forsman et al. 2001). Northern flying squirrels and woodrats are usually the predominant prey species. Other prey species include red tree vole, red backed voles, mice, rabbits and hares, birds, and insects.

Management and Population Trends

The Recovery Plan for the northern spotted owl (USFWS 2008) has developed a habitat management strategy for fire-dominated east-side Provinces that is intended to maintain spotted owl habitat in an environment of frequent natural disturbances. The Mt. Hood National Forest is part of the Willamette Province which is used for planning and consultation with the USFWS. There are several other Provinces in Oregon that are referenced for informational purposes. No Managed Owl Conservation Areas are identified in these Provinces, because it is assumed that the severe natural disturbance regime precludes long-term persistence of any static habitat management areas. Rather, a landscape approach that promotes spotted owl recovery within the broader goal of ecological sustainability is recommended (USDI 2008). Active management to reduce wildfire and insect outbreak risks would be required to offset risks of habitat loss. Recovery Action 7 directs agencies to manage lands in east-side Provinces outside of the high-quality habitat patches to restore ecological processes and functions, and to reduce the potential for significant losses by stand-replacing fires, insects, and disease.

The *Status and Trends in Demography of Northern Spotted Owls* (Anthony et.al. 2006) states that the spotted owl numbers have fallen by roughly half over the past decade in parts of Washington, and the Confederated Tribes of the Warm Springs Reservation in Oregon, and they have dwindled by nearly a quarter in sections of Oregon's Coast and Cascade ranges. In only a few areas are owls maintaining their numbers. This report stated that determining the cause of this decline is beyond the scope of this study, and they could only speculate among the numerous possibilities, including competition from barred owls, loss of habitat from wildfire, timber harvest including lag effects from prior harvest, poor weather conditions, and defoliation from insect infestations.

The *Scientific Evaluation of the Status of the Northern Spotted Owl* (Sustainable Ecosystems Institute, Courtney et al. 2004) indicated that population declines of the spotted owl over the past 14 years were expected, they concluded that the accelerating downward trends on some study areas in Washington where little timber harvest was taking place suggest that something other than timber harvest is responsible for the decline.

Methodology

Disturbance

The U.S. Fish and Wildlife Service (USFWS) has concluded that noise, smoke, and human presence can result in a disruption of breeding, feeding, or sheltering behavior of the spotted owl such that it creates the potential for injury to individuals (i.e. incidental take in the form of harassment). For a significant disruption of spotted owl behavior to occur as a result of disturbance caused by the Proposed Action, the disturbance and spotted owl(s) must be in close proximity to one another. Human presence on the ground is not expected to cause a significant disruption of behavior because spotted owls do not seem to be startled in those situations.

A spotted owl that may be disturbed at a roost site is presumably capable of moving away from the disturbance without a substantial disruption of its behavior. Since spotted owls forage primarily at night, projects that occur during the day are not likely to disrupt its foraging behavior. The potential for effects is mainly associated with breeding behavior at active nest sites.

In the late breeding period, potential effects from disturbance decline because juvenile spotted owls are increasingly more capable of moving as the nesting season progresses. To ensure that more than 86 percent of juvenile spotted owls in the Oregon Eastern Cascades Physiographic Province are able to move away from disturbance without increasing their risk of predation or harm, the critical breeding period is considered to be March 1st through July 15th. After July 15th, it is estimated that most fledgling spotted owls are capable of sustained flight and can move away from most harmful disturbances.

The USFWS has based disruption distances on interpretation of the best available information. The Proposed Actions for this project that generate noise above ambient levels would be helicopters, heavy equipment, and chainsaw use. Disruption distances of 0.25 miles for helicopters, 35 yards for heavy equipment, and 65 yards for chainsaws have been set by the USFWS.

Analysis Area

Since there are few recent surveys for spotted owls that show the locations of active nest sites on the Forest, historical spotted owl information is used. Historical nest sites are used because studies show that nests are used for many years and when a site has been found to be unoccupied during surveys, it can be subsequently utilized by a different pair of owls years later. In addition to historic sites, predicted nest sites would be used to analyze the effects of the proposed project on spotted owls. The predicted sites are used for areas with incomplete or no spotted owl survey information. The purpose of using predicted sites is to estimate spotted owl numbers and distribution within unsurveyed habitat for purposes of assessing the effects of a proposed project on spotted owls. These predicted sites are based on factors known to influence the carrying capacity of a given area for spotted owls.

While it is usually the alteration or removal of suitable habitat that potentially results in adverse impacts to a territorial pair of spotted owls, the loss or degradation of dispersal habitat may also result in short-term impacts. The USFWS has guidelines for how much removal of suitable habitat would result in take, but there are no such guidelines for dispersal habitat.

For the Willamette Province the home range is a 1.2 mile radius circle (2,955 acres) centered on a historic nest site. The proposed projects are within the home range of 2 pairs of owls, but the project only impacts habitat for one pair. As a result, the analysis was done for the pair by the existing Hood River Meadows parking lot only. Portions of these owls home range are classified as non-habitat because they are above 5,000 feet in elevation, which is the upper limit for spotted owl habitat. The owl analyzed for this project is the highest elevation nest site on the east-side of the Forest.

Incidental take would be presumed to occur when suitable habitat is removed from a home range if suitable habitat is less than 40 percent of the home range. A core area has been defined as the area within a home range that receives disproportionately high use (503 acres or 0.5 mile radius

circle from the historic nest). Incidental take would be presumed to occur when suitable habitat is removed from a core area and if suitable habitat is less than 50 percent of the core area. Table 3-62 shows that this pair of owls has a Home Range with approximately 51.2 percent Suitable and a Core Area with 66.3 percent Suitable habitat available.

Table 3-62: Amount of habitat and percent of available habitat in Core Area and Home Range.

Habitat Type	Acres	% of Home Range
Non- Habitat	874.8	30.2
Capable	538.6	18.6
Suitable Without Nesting Structure	1169.7	40.4
Suitable	312.0	10.8
Total	2895.1	100.0

Habitat Type	Acres	% of Core Area
Non- Habitat	51.6	10.3
Capable	118.0	23.4
Suitable Without Nesting Structure	300.4	59.7
Suitable	33.5	6.6
Total	503.5	100.0

Surveys were completed for the project area for northern spotted owls. A spotted owl was detected in the project area follow-up surveys were completed but the nest was never located. Due to the detection, it is assumed that this site is currently occupied.

Even though much of the habitat in this home range lacks the structural components that provide for nest sites, the habitat is considered high quality foraging and is likely providing enough habitat to support spotted owl survival and reproduction. While GIS layers show that this habitat is dispersal habitat, ground verification shows that the dispersal habitat is actually considered suitable habitat (high quality foraging). Analysis for irretrievable loss to NSO habitat was completed by measuring each of the three habitat types based on all impacting alternative components in ArcGIS.

Region 6 Sensitive Species

Wolverine

Habitat

The wolverine needs large tracts of undeveloped and uninhabited areas and are considered highly sensitive to human presence. Wolverines inhabitat a variety of habitats in the alpine, tundra, taiga, and boreal forest zones. They are found in coniferous, mixed, and deciduous woodlands, bogs, and open mountain as well as tundra habitats (Mitchell-Jones et al. 1999) Studies indicate that resident populations of wolverines occur primarily in areas with snow cover that persists through mid-May at the end of the wolverine denning period (Aubrey et al 2007). In the mountains of the western contiguous U.S., these climactic conditions are limited to high-elevation areas in the Cascade Range.

Home ranges of adult wolverine in North America range from less than 62 square miles to over 560 square miles. The variation in home range sizes among studies may be related to differences in the abundance and distribution of food. Male home ranges are typically larger than those of females. Transient wolverines likely play a key role in the maintenance of spacial organization and the colonization of vacant habitat (Ruggerio et al. 1994). Factors that affect movements of dispersing individuals may be important to population and distribution dynamics.

Wolverine dens are made by tunneling in the snow, and may or may not be associated with trees or boulders (Magoun and Copeland 1998). Dens in Alaska were usually long, complex snow tunnels with no associated trees or boulders. In contrast, dens in Idaho were always associated with fallen trees or boulders. All dens were covered with at least 3 feet of snow. With few exceptions, wolverine dens described to date have been located in alpine, subalpine, taiga, or tundra habitat. Reports of dens in low elevation, densely forested habitats are rare.
It appears that the limiting factor for wolverine is the presence of an abundant, large mammalian prey base, and the exclusion of human presence (Hatler 1989). Wolverine habitat selection is negatively affected by human activity, including roads, infrastructure, and backcountry recreating (May et al. 2006: Krebs et al. 2007).

Wolverines are generally described as opportunistic omnivores in summer and primarily scavengers in winter. Studies have shown the importance of large mammal carrion and the availability of large mammals underlies the distribution, survival, and reproductive success of wolverines. Over most of their range, ungulates are the main sorce of carrion. Large mammals are important all year, although carrion tends to be more available in the fall and winter.

Methodology

Wolverine tracks have been observed near the Highway 35 corridor. The higher elevations of the project area may provide suitable denning habitat. However, the amount of human use most likely reduces the likelihood of denning in the area. Due to the wide ranging nature of wolverines, it is possible that MHM could be within a wolverine's home range and that an animal could forage there, especially during the late winter and early spring when elk and deer carcasses may be available.

Peregrine Falcon

Habitat

The Peregrine is a medium-sized raptor that has adapted to a wide range of prey and nesting locations. They feed primarily on other birds and 92 prey species have been identified at Pacific Northwest nest sites ranging in size from humming birds to western gulls (Henny and Nelson 1981). Other prey species include bats, ground squirrel, gray squirrel, chipmunks, and mountain beaver.

In Oregon, peregrines occur as resident and migratory populations. They nest on cliffs ranging from 75 to 1,500 feet in height, and within 1 mile of some form of water. The average occupied cliff size in the Cascade Mountains is 229 feet (Marshall, et al. 2003) . Cliff nests are on ledges as well as potholes and stick nests originally constructed by other raptors are common. Peregrines often use the same nest in consecutive years but some pairs also may use a different nest site each year. Nesting occurs in xeric areas of eastern Oregon, montane habitats that extend to over 6,000 feet elevation, small riparian corridors statewide, and more recently in urban habitats of the lower Willamette and Columbia rivers (Marshall, et al. 2003).

Adults remain in the vicinity of nest sites throughout the year at Pacific Northwest locales below 4,000 feet. At lower elevations, eggs are usually laid by mid-March to mid-April, but may vary at any single site up to 6 weeks. Fledging occurs late May through mid-August, depending on site elevation and weather. The peregrine falcon is sensitive to disturbance during the breeding season, but reaction to human disturbance is highly variable among individuals. Peregrines seem to be more sensitive to disturbances occurring above or at the same level as cliffside eyries, than to disturbances occurring below eyries.

Methodology

Surveys were conducted on the Forest in the 1990's. Nest sites were confirmed on the Zigzag and Clackamas Districts. There are records of sightings of peregrines in the project area however, it's expected that sightings are primarily of transient birds. There is suitable nesting habitat within one mile of the project area, but occupancy of this habitat is currently unknown. The home range of a falcon occupying this nest site would overlap with the project area and would use the project area as foraging habitat.

Survey and Manage (Great Gray Owl)

Habitat

The great gray owl is one of the largest of the North American owls. It is the only member of the *Strix* genus found both in North America and Eurasia. It is essentially a bird of the boreal forests, occupying a latitudinal band from Scandinavia through much of the former Soviet Union (Mikkola 1983) and from Alaska through Ontario (Bull and Duncan 1993). The owl's northern limits generally coincide with the tree line; trees are critical for nesting, for cover and for hunting perches. The great gray owl is unevenly distributed throughout its range. It is known to occur in the following physiographic provinces within the Northwest Forest Plan area: WA Western Cascades, WA Eastern Cascades, OR Western Cascades, OR Eastern Cascades, OR Coast Range, OR Willamette Valley, OR Klamath, CA Klamath, and CA Cascades where suitable nesting, roosting and foraging habitat is present (Interagency Species Management System (ISMS) data 2003, Winters et al, 1986, Fetz, et al.).

The great gray owl's breeding range includes areas outside the boreal forests in the western United States. In Montana, Wyoming, Idaho, Washington, Oregon, Nevada and California, it is found in montane and subalpine forests (Winter 1986, Bull and Henjum 1987, Forsman and Bryan 1987, Bull and Duncan 1993). The most westerly and southerly portions of this breeding range include areas covered under the Northwest Forest Plan (Huff et al. 1996). Their home range size may change depending on food supply, but averages 2.8 square miles.

Great gray owls are long-lived (approximately 11 years), capable of high reproduction (nesting annually and producing clutches of as many as nine eggs; Mikkola 1993, Bull and Duncan 1993), and capable of traveling great distances (Nero 1980, Duncan 1992). Radio-tracking shows that individuals can travel up to 25 miles in 24 hours and 400 miles in 3 months. They tolerate other owls and other birds of prey within their home range (Mikkola 1983) and defend only a small area around their nests (Bull and Duncan 1993). Competition for nest sites with other owls and raptors is likely greater than competition for prey. The highest reported nesting density in North America is 0.73 pairs per square mile in Manitoba and northern Minnesota (Duncan 1987). Bull and Henjum (1990) calculated densities of 0.66 pairs per square mile on their two eastern Oregon study areas.

Courtship generally begins in late February or early March. Breeding and egg-laying may take place as early as late March or as late as early June (Platt and Goggans 1991). Egg-laying may be delayed in areas with heavier snows or lows in the prey cycle. Clutch size varies from one to four eggs and females incubate the eggs while the male brings her prey (Bull and Henjum 1990). Incubation takes about 28 to 29 days.

Great gray owls hunt primarily from perches, listening and watching the ground intently. When prey is detected, the owl usually flies only a short distance averaging 35 feet (Bull and Henjum 1990), but may fly up to 328 feet to catch prey (Bull and Duncan 1993). Great gray owls can detect and capture prey by sound alone, which allows them to capture prey beneath snow. Hunting usually occurs nocturnally, but they may hunt in the morning and evening daylight hours when numerous young are being fed. Despite their large size, great gray owls utilize relatively small prey. In the western U.S., the primary prey are pocket gopher and voles (Mikkola 1983 and Bull and Duncan 1993). Great gray owls tend to forage in meadows or other openings, though males in Northeastern Oregon were noted foraging in forest stands with 11 to 59 percent canopy closure (Bull and Henjum 1990). Within the Western Cascades Physiographic Province of Oregon, the preliminary data reviewed suggests that some great gray owls are foraging within the nest stands.

Similar to most owls, great gray owls do not construct nests or carry nesting materials (though females may scratch a depression in the bottom of a nest such as a snag). Great gray owls are, therefore, dependent on existing nests. Potential substrates include stick nests built by common raven and hawks, squirrel nests, broken-top snags, the platforms caused by infections of dwarf-mistletoe, and artificial platforms. Availability of nest sites and suitable foraging habitat are considered the most important factors determining habitat use by breeding great gray owls (Collins 1980, Nero 1980, Mikkola 1983). Since foraging and nesting habitat can be quite different, proximity of these two habitat types is important as well.

Great gray owls preferred to nest in mature or older stands, with a fairly open understory and dense overstory of 60 percent or greater canopy closure (Bull and Henjum 1990). In Eastern Oregon, nest tree size ranged from 23 to 31 inches in diameter. The birds tend to select nest sites in forests near meadows or other openings that have sufficient prey numbers. However, they would nest in a wide variety of habitat types as long as the required habitat characteristics exist.

Methodology

Surveys for great gray owls were conducted on the Forest in 1997 and 1998. They have not been documented in the project area, but are defined as "suspected" to occur on the Forest. An owl was detected on the Warm Springs Reservation approximately 20 miles south of the project area in 2004. The project area contains habitat that is considered suitable for nesting which includes nesting structure (broken top trees or other nesting platforms) and adjacent meadows for foraging. Given the home range size of the great gray owl, the project area would only support one nesting pair's territories.

Surveys for great gray owls are required when an activity has a likely substantial negative impact on the species habitat, its life cycle, microclimate, or life support requirements (Survey & Manage ROD 2001). While some trees would be removed, the impact from this activity is insignificant when analyzed in the context of the owls habitat requirements and the size of it's home range. Surveys were not conducted because the impacts from the proposed project do not pose a

substantial negative impact to the species. See the Direct, Indirect and Cumulative Effects Section for more details on the impacts to great gray owls.

Management Indicator Species

General Methodology for all MIS

The National Forest Management Act requires the Forest Service to manage wildlife habitat to "maintain viable populations of existing native and desired non-native vertebrate species in the planning area." The National Forest Management Act requires the Forest Service to identify Management Indicator Species through the planning process, and to establish objectives to maintain and improve the habitat of indicator species. The primary assumption of this process is that indicator species represent the habitat needs of other species because they have similar habitat requirements. Spotted owls, for example, indicate the needs of a variety of animals that use old growth forest. This analysis focuses on certain key species and does not specifically address common species except to the extent that they are represented by these management indicator species.

Management Indicator Species as defined by the Forest Plan for this portion of the Forest include northern spotted owl, pileated woodpecker, American marten, deer and elk, gray squirrel, and wild turkey (Table 3-63).

Table 3-63: Management Indicator Species for the Project Area.

Management Indicator Species	Habitat Description	Habitat Present in Analysis Area	Species Present in Analysis Area
Northern Spotted Owl	Old Growth	Yes	Documented
Deer	Early Forest Succession Mature/Old Growth	Yes	Documented
Elk	Early Forest Succession Mature/Old Growth	Yes	Documented
Pileated Woodpecker	Mature/Over Mature	Yes	Documented
American Marten	Mature/Over Mature	Yes	Documented
Gray Squirrel	Old Growth Ponderosa Pine Pine/Oak	No	Not Present
Wild Turkey	Old Growth Ponderosa Pine Pine/Oak	No	Not Present

With the selection of some of these species there was a special emphasis on mature, over mature, and old growth habitat. The selection was done at a time when timber harvest was planned to replace many older stands with younger more rapidly growing stands: it was suspected that the mature and over mature stands would decline and the species associated with this habitat could be lost. Several species were selected to represent all of the species that required this type of habitat. A Forest-wide analysis for Management Indicator Species has been conducted: the report is incorporated by reference and is available in the project record located in Hood River, Oregon.

Mule Deer and Elk

Habitat

Deer and Elk were selected as Management Indicator Species (MIS) in the Forest Plan because they are economically important game animals. Based on State and global rankings, deer and elk are common, widespread and abundant. The Oregon Department of Fish and Wildlife (ODFW) consider deer and elk game species. Deer and elk utilize early-successional habitat for foraging and were originally thought to require mature and old growth forest for thermal cover.

The Forest Plan Standards and Guidelines have minimum requirements for optimal and thermal cover habitat components, but no specific level for forage. During the 1980s and 1990s wildlife managers considered thermal cover to be important to deer and elk survival and production. Over time, wildlife managers have questioned if elk required thermal cover. Currently, there is not much support from the elk research community for the necessity of thermal cover for elk. John Cook indicated at the Elk Modeling Workshop (April 2010) that telemetry data indicated elk were negatively associated with cover. Cook indicated that openings are far more valuable for elk than cover. With the reduction in regeneration timber harvest, the Forest now has abundant optimal and thermal cover, but openings for forage are becoming scarce. There are approximately 69,226 acres of early-seral habitat on the Forest. This level is declining over time since plantations have grown dense with trees that shade out forage.

Deer and elk populations on the Forest are stable with a future anticipated trend of declines from a reduced amount of early-successional habitat due to reductions in harvest, differences in harvest methods, and low levels of wildfires. This is general consensus among biologist on the Forest and ODFW. There is limited data to support this because dense cover makes surveys too difficult to be reliable. At this time, there is no concern for viability of the species by ODFW. If viability becomes a concern, ODFW would close or limit the hunting season.

High road densities lead to harassment of elk herds. Harassed elk move more often than elk left alone and use of habitat decreases as road density increases (Witmer 1985). It is also recognized that elk within or moving through areas of high open-road densities move longer distances; often several miles per day. There are limited open roads in the Permit Area and vehicle displacement is likely due to Highway 35. This has a greater impact than the access associated with Elk Meadows Trail and summer workers for Meadows.

The project area supports elk and deer for most of the summer and fall months by providing rearing habitat and summer range. Deer and elk move to lower elevations during the winter months and would not utilize the project area during this time. Optimum habitat for elk consists of approximately 40 percent cover habitat and 60 percent forage habitat. Within the Permit Area hiding cover is abundant and forage habitat is limited. MHM has a Permit Area of 3,554 acres. Of this total, 178.1 acres of natural openings and 235.8 acres of created openings have been utilized.

Forage is widely available on the District, but is generally of low quality. The low quality forage, and the lack of wetlands and permanent low-gradient streams on the District are considered one of the limiting factors for elk and possibly deer. The shapes and sizes of forage areas influence the level of use, deer and elk prefer to feed near forested cover. The eastern half of the Permit Area

remains sufficiently forested so that elk and deer use of natural meadows and existing ski trails is probably near optimal, considering the effect of nearby roads. Areas around the main lodge have fragmented forested patches next to forage areas that do not provide for sufficient cover for use to be consistent or measurable. This is exacerbated by the amount of human disturbance that occurs year round located in and around forage areas.

The most heavily used forage areas observed in the past were in the stringer meadows. The few wetlands areas existing on cleared ski runs are also fairly heavily used. Areas of huckleberry and other shrubs (such as willows) are occasionally heavily used in old-growth forest areas. However, cleared runs, natural subalpine and alpine meadows, and other natural openings were barely used (FEIS 1990). Evidence of forage utilization by big game is lowest in cleared runs. Ongoing ski area development has caused declines and seasonl changes in use of historical forage areas by elk and deer. Much of the use of forage areas appears to be nocturnal, as a result of human activity associated with existing ski area development.

Thermal cover for elk is defined as a stand of coniferous trees at least 40-feet tall with an average crown closure of 70 percent or more. Optimal cover is found mainly in multi-storied mature and old-growth stands. Within the Permit Area the lower half is optimal habitat for deer and elk, and within the project area the habitat is primarily optimal thermal cover. The old growth forests provide fair to good summer thermal and hiding cover adjacent to open areas, where the forest is in fairly large contiguous blocks. Areas cleared for runs, however, are too narrow and open to provide adequate hiding or summer thermal cover.

Elk herds in the East Fork Hood River Watershed likely exhibit a close association with riparian habitat in areas of gentle terrain and low road density. Research on elk in this type of habitat generally shows that elk spend most of their time in close proximity to streams or wetlands. This kind of habitat is in and adjacent to the project area. Due to past timber sales there are openings that allow for foraging opportunities with cover close by. Huckleberry and other key forage habitat like meadows are inside the Permit Area. Keeping contiguous forested routes to and from the area is important for deer and elk migration to other key areas like the white river, teacup and pocket creek areas.

Methodology

Deer and elk were observed within the Permit Area, site specific surveys were not completed for the analysis. Assumptions for Deer and Elk include that the Permit Area and adjacent habitat is at or near carrying capacity. Its also assumed that habitat use is not evenly distributed throughout, specifically that deer and elk tend to use the eastern portion of the project area and at higher elevations in the ski runs where there is little human use during the Summer.

Pileated Woodpecker

Habitat

The pileated woodpecker was chosen as a MIS because of its need for large snags, large amounts of down woody material, and large defective trees for nesting, roosting and foraging. Pileated woodpeckers use mature and older, closed canopy stands for nesting and roosting, but may use younger (40-70 years), closed-canopy stands for foraging if large snags are available; large snags and decadent trees are critical habitat components for pileated woodpeckers (Hartwig et al. 2004, Mellen et al. 1992).

The mean home range for pileated woodpeckers is 1,181 acres with approximately a 9 to30 percent overlap (about 200 acres) between territories. Therefore an average home range with overlap for pileated woodpeckers would be approximately 970 acres (Mellen et al. 1992).

Methodology

There are 405,092 acres of pileated woodpecker habitat on the Mt Hood National Forest based on GIS data for habitat 80 years and older. By dividing the acres of pileated woodpecker habitat by the average home range with overlap of 970 acres there are 418 potential home ranges on the Forest. With an average clutch size of 4 (Marshall, D.V. et al. 2003), this would indicate that the summer population of pileated woodpeckers could be as high as 2508 birds including adults and fledglings. There is a approximately 2516 acres of suitable habitat available for pileated woodpeckers within the Permit Area, and a potential for 2.6 home ranges in the Permit Area. Surveys were not conducted for this species, home ranges are presumed to be occupied for this analysis

American Marten

Habitat

The American marten is referred to as the pine marten in the Forest Plan. The American marten is an indicator species of mature or older forests with dead and defective standing and down woody material. It has a feeding area that utilizes several stand conditions that range from poles to old growth. American martens often utilize higher elevation sub-alpine stands and prefer older habitat with a highly complex component of dead trees and down wood with cavities (Buskirk 1994). They prefer mature forests with closed canopies, but sometimes use openings in forests if there are sufficient downed logs to provide cover (Csuti 1997).

The Forest has approximately 21,553 acres of habitat that have a 30 percent or higher probability of supporting American marten. A home range of 173 acres was used in determining the number of home ranges on the Forest. There are approximately 63 to125 home ranges for martens on the Forest. The original Forest Plan analysis for marten overestimated habitat at 231 home ranges. The current model is closer to predicting the actual population because it is supported by tracking information provided by Cascadia Wild (winter tracking data and camera stations). Home ranges may contain two adults and up to three young. The estimated population on the Forest is 310-625 martens.

In the western United States, the American marten's distribution is fragmented. Summaries of track plate and camera surveys (Kucera et al. 1995) show that marten continue to be distributed throughout the Sierra Nevada and Cascades but are absent from the historic range in northwest California. Home ranges vary from 1 to 4.5 square miles for males and from 0.4 to 3.6 square miles for females (Simon 1980, Zielinski et al. 1997).

Martens prey on vertebrates smaller and larger than themselves, eat carrion, and forage for bird eggs, insects, and fruits (Marten 1994). Their diets in summer include a wide range of food types, while berries are important in the fall. As snow cover increases, martens utilize mostly mammalian prey, the most important of which are ground squirrels, mice, and rabbits. Martens forage by walking along the ground or snow surface, with forays up trees, investigating possible

feeding sites by sight and smell. They can easily become habituated to human foods and will inhabit areas with relatively high levels of human use in order to take advantage of discarded food items.

American martens are closely associated with forested habitats with complex physical structure near the ground. Structure can include the lower branches of living trees, tree boles in various stages of decomposition, coarse woody debris, shrubs, and rock fields. Use of non-forested habitats by martens increases in summer and includes meadows and small harvest units near forest edges, as well as areas above the tree line in western mountains (Buskirk and Ruggiero 1994). While martens may utilize meadows and small harvest units, marten populations markedly decline in areas with clear cut logging (Thompson and Harestad 1994).

Suitable habitat for marten is most commonly created by ecological succession. However, in some instances, disturbances such as disease, fire, and timber cutting that leave coarse woody debris can increase structure near the ground over the short term.

Methodology

The project area contains habitat that is suitable for denning and foraging and marten were documented in the project area in August of 2010 and in January 2012. Habitat is assumed to be throughout most of the permit area.

Snag and Down Log Associated Species

Many wildlife species in the Pacific Northwest evolved to use large snags and logs that were historically abundant on the landscape and the loss of these forest components reduces the ability of these species to persist in these habitat types. Approximately 236 acres within the Permit Area has had trees, snags, and logs removed in the past to construct ski runs, chair lifts, maintenance buildings, road construction, and parking lots.

Methodology

DecAID is a planning tool intended to help advise and guide managers as they conserve and manage snags, partially dead trees and down wood for biodiversity (Mellen et al. 2003). It also can help managers decide on snag and down wood sizes and levels needed to help meet wildlife management objectives. This tool is not a wildlife population simulator nor is it an analysis of wildlife population viability.

A critical consideration in the use and interpretation of the DecAID tool is that of scales of space and time. DecAID is best applied at scales of subwatersheds, watersheds, subbasins, physiographic provinces, or large administrative units, such as Ranger Districts or National Forests. DecAID is not intended to predict occurrence of wildlife at the scale of individual forest stands or specific locations. It is intended to be a broader planning aid not a species or stand specific prediction tool.

Modeling biological potential of wildlife species has been used in the past. DecAID was developed to avoid some pitfalls associated with that approach. There is not a direct relationship between the statistical summaries presented in DecAID and past calculations or models of biological potential.

Refer to the DecAID web site listed in the References section for more detail and for definition of terms (Mellen et al. 2003). This advisory tool focuses on several key themes prevalent in recent literature:

- Decayed wood elements consist of more than just snags and down wood, such as live trees with dead tops or stem decay.
- Decayed wood provides habitat and resources for a wider array of organisms and their ecological functions than previously thought.
- Wood decay is an ecological process important to far more organisms than just terrestrial vertebrates.

The project area is located within the habitat type identified in DecAID as the Montane Mixed Conifer in the vegetation condition of "large trees." For this forest type, the DecAID advisor identifies the 30 percent tolerance level for snags as 11 snags per acre greater than 10 inches and 3.7 per acre greater than 20 inches in diameter. It identifies the 30 percent tolerance level for down wood as 3.3 percent cover of down wood (including all decay classes) with sizes of logs averaging 10 to 21 inches in diameter. Most of the forested portions of the project area contain snag and down wood numbers above the 30 percent tolerance level.

Neotropical Migratory Birds

Habitat

In 1990, there were approximately 40 species of birds recorded within the MHM Permit Area. Some of the species observed included the mountain chickadee, red crossbill, golden-crowned kinglet, yellow-rumped warbler, pine siskin, red-breasted nuthatch, American robin, rufous hummingbird, and evening grosbeak. Species specific to MHM area are Nashville warbler, yellow warbler, hermit warbler, hermit thrush, Lincoln's sparrow, and purple finch. Eight of the birds were cavity nesters including hairy woodpecker, northern flicker, pileated woodpecker, American Kestrel, violet green swallow, mountain bluebird, mountain chickadee, and redbreasted nuthatch. Other likely species include the black-backed woodpecker and the three-toed woodpecker because suitable habitat exists. The pileated woodpecker, a MIS of mature and old growth forests, appears to be distributed thoughout the Permit Area. An abundance of snags and mature timber in the area indicates that habitat is optimal. A Lewis woodpecker was observed in the area. Another focal species, the blue grouse, inhabits the subalpine fir portions of the project area.

Methodology

Bird surveys were not conducted. However, Species that were seen while on field trips or during other work were noted. Species present from previous surveys and information from past planning efforts at MHM are assumed present in the Permit Area.

Conservation strategies for land birds of the east slope of the Cascade Mountains in Oregon and Washington and a conservation strategy for land birds in coniferous forests in western Oregon and Washington were prepared in June 2000 and March 1999 respectively by Bob Altman of American Bird Conservancy for the Oregon-Washington Partners in Flight. The strategies are designed to achieve functioning ecosystems for land birds by addressing the habitat requirements

of "focal species." By managing for a group of species representative of important components of a functioning ecosystem, it is assumed that many other species and elements of biodiversity would be maintained.

Table 3-64 displays the focal species potentially positively or negatively affected by changes in habitat in the eastern slope of the Cascade Mountains region, and the forest conditions and habitat attributes they represent.

Table 3-64: Focal Migratory Bird Species

Forest Conditions	Habitat Attribute	Focal Species
Ponderosa Pine	Old forest, large patches	White-headed woodpecker
Ponderosa Pine	Large trees	Pygmy nuthatch
Ponderosa Pine	Open understory, regeneration	Chipping sparrow
Ponderosa Pine	Burned old-forest	Lewis' woodpecker
Mixed Conifer	Large trees	Brown Creeper*
Mixed Conifer	Open understory, regeneration	Williamson's sapsucker
Mixed Conifer	Grassy openings, dense thickets	Flammulated owl
Mixed Conifer	Multi-layered, structural diverse	Hermit thrush
Mixed Conifer	Fire edges and openings	Olive-sided flycatcher*
Oak-Pine Woodland	Early-seral, dense understory	Nashville warbler
Oak-Pine Woodland	Large oaks with cavities	Ash-throated flycatcher
Oak-Pine Woodland	Large pine trees/snags	Lewis' woodpecker
Lodgepole Pine	Mature/old-growth	Black-backed woodpecker
Whitebark Pine	Mature/old-growth	Clark's nutcracker
Montane Meadows	Wet and dry	Sandhill crane
Aspen	Large trees/snags, regeneration	Red-naped sapsucker
Subalpine fir	Patchy presence	Blue grouse*

*Significantly declining population trends in the Cascade Mountains Physiographic Region.

Focal species chosen for analysis due to habitat being impacted include: Nashville warbler, Lewis' woodpecker, Hermit thrush, and brown creeper.

3.7.3 Direct, Indirect and Cumulative Effects

Direct Impacts Common to Alternatives 2-6

The direct wildlife effects common to all alternatives include habitat loss, alteration of habitat through clearing of forested areas, creation of early seral habitats, increased fragmentation, alterations or loss of special features such as snags and down logs, loss of thermal and hiding cover, and harassment by increased human presence during construction. These direct impacts are discussed in the species-specific discussions below as appropriate.

Threatened and Endangered Species (Northern spotted owl)

No Action Alternative (Alternative 1) - Direct and Indirect Effects

There would be no short-term effects to the spotted owl under this alternative. The habitat would

continue providing foraging, roosting and dispersal habitat in the short-term. Stands that are dispersal habitat would become suitable habitat and capable habitat (capable habitat is that which would eventually provide for dispersing, nesting, roosting, foraging, but at the current time is not providing any habitat and can restrict dispersal.) would become dispersal habitat in the long-term adding to the amount of habitat for this territory. The number of snags and down wood that provide habitat for prey species would remain unaltered while allowing for larger snags and down wood to be recruited. With the No Action Alternative, there would be no sound related disturbances associated with the parking lot or other construction activities.

Proposed Action (Alternative 2) – Direct and Indirect Effects

The following components of Alternative 2 have no direct and indirect effects to spotted owls.

- Left- and Right-Turn Lanes- There is no direct or indirect effects related to the creation of the left- and right-turn lanes, because habitat is not being removed. This includes the wetland relocation as well. Work is taking place within 50 feet of the road prism on either side and activities would take place outside the disturbance and disruption distance, this component for all alternatives is **not likely to adversley affect** for northern spotted owls and will not be analyzed further for this species.

- Sunrise Vehicle Maintenance Shop- A vehicle maintenance shop would be constructed on 1.8 acres on the north side of the existing Sunrise Parking Lot. No access road would need to be constructed. There is no direct, indirect or cumulative effect for this component because work is done above the elevation for spotted owl habitat and work would be completed more then a quarter mile away.

- Nordic Guest Services Building- The loss of habitat and disturbance associated with sound is included in the creation of Twilight Parking Lot. This component is not expected to have any negative direct or indirect effects to spotted owl habitat for all alternatives. There is a positive direct effect by moving the user service farther away from the nest patch during the critical nesting period during spring use.

- Sahalie Falls Trail- There are no direct or indirect effects associated with this component because there are no changes from the existing condition.

- All construction activities for all action alternative's would take place outside the disruption distance for noise and is **not likely to adversley affect** for northern spotted owls.

The following components of Alternative 2 have direct and indirect effects to spotted owls. The direct and indirect effects include impacts to habitat as well as disturbance associated with construction activities.

- Twilight Parking Lot- Direct effects of this component are permanent habitat removal and fragmentation within the core area and home range for the spotted owl, and altering prey distribution and abundance. Under this alternative a total of 9.4 acres would be removed in order to construct a parking lot, an access road, a storm water facility and provide for snow storage. The Twilight Parking Lot removes 5.6 acres of suitable habitat and 3.8 acres

of capable habitat. There are two access roads being created in spotted owl habitat. One for the Twilight Parking Lot and the Twilight Equipment Maintenance Yard, there is a total of 0.9 acres of suitable habitat being removed. Loss of down wood, understory, and snags that provide habitat for prey species would impact spotted owls by altering prey species distribution and abundance in an area that is used primarily as roosting and foraging habitat.

- Twilight Equipment Maintenance Yard- Approximately 2.9 acres would be permanently cleared for an equipment maintenance yard (bus and snow equipment parking and a shop building) and access road. Direct effect of this component would be permanent habitat loss of 2.1 acres of suitable and 0.8 acres of capable spotted owl habitat, fragmentation of the landscape, and loss of snag and down wood prey habitat.

- Nordic Trails- A total of 2.6 acres would be cleared for ski trails. Of this total, 1.0 acres are suitable habitat and 1.6 acres are capable habitat that would be removed within the core area for the spotted owl. The distance of approximately 35-feet across would not inhibit dispersal, roosting or foraging capabilities. It is possible that there would be a slight increase in small mammalian prey base through the Nordic trails allowing for a positive indirect effect.

- Utility Lines- This component would result in no destruction of habitat. Work would occur in already cleared and disturbed areas that do not contribute to habitat for spotted owls. The work would occur in closer proximity to the spotted owl nest patch which increases the likelihood of disruption to nesting activities. The PDC would result in no direct or indirect effect because work would occur after the critical nesting period, and no habitat would be lost.

Spotted owls need a minimum 40 percent suitable habitat within their home range to provide the resources necessary to meet essential life functions (Thomas et al. 1990, Courtney et al. 2004). Spotted owls need a minimum of 50 percent suitable habitat within their core area. As the amount of suitable habitat in an owl's home range decreases, so does site occupancy, reproduction, and survival (Courtney et al. 2004). In addition to impacts within the home range much of the Proposed Action is within the core area for this spotted owl. A total of approximately 9.6 acres of suitable habiatat would be removed. The degradation and removal of suitable habitat may affect and is **likely to adversely affect** northern spotted owls under this alternative, but not likely to cause take.

Even though this owl habitat lacks the structural components that provide for nest sites, the foraging habitat in this home range is considered high quality and is likely providing enough habitat to support spotted owl survival and reproduction. The combined suitable and foraging habitat is approximately 67 percent in the core area and 51 percent in the home range and would not change dramatically after implementation of the proposed project. Although the habitat removal would result in a likely to adversely affect determination for impacts to spotted owl, there is enough habitat would be maintained for survival and reproduction of this pair.

Cumulative Effects

Cumulative effects were looked at within the Permit Area, and immediately adjacent to ther permit area (e.g. Oregon Department of Transportation [ODOT] shed, Highway 35), the time scale for effects was recent past, currently proposed, and foreseeable future projects. Refer to Chapter 3 of the EIS for the projects considered in relation to cumulative effects.

All of the projects listed could cause some level of disturbance to spotted owls by habitat degradation or loss, heavy equipment, chainsaw use, and other noise disturbance. Impacts associated with the proposed projects are mitigated with PDC. Project work is anticipated to take place during daylight hours when spotted owls are usually inactive, reducing the chance of disturbing foraging behavior, limiting further the direct negative effect.

Habitat lost due to previous pre-commercial thinning and maintanence of ski routes has a direct effect on spotted owls. Fragmentation of their home range and core area has been and would remain impacted into the future. The current amount of habitat lost due to maintenance activities is not putting the spotted owl pair in peril, suitable and dispersal habitat is still above thresholds for the pair.

New Nordic Trails (Alternative 3) – Direct and Indirect Effects

The effects for the Sahalie Falls Hiking Trail are the same as those discussed in Alternative 2. There are no impacts to spotted owls. The actions associated with the Utility Lines do not change between Alternatives, so there is no change in impacts to spotted owls from those discussed under Alternative 2.

The following components of Alternative 3 have no direct and indirect effects to spotted owls.

- Sunrise Vehicle Maintenance Shop- A total of 3.4 acres would be cleared for this project. sThere are no direct, indirect or cumulative effect for this component because work is done above the elevation for spotted owl habitat. Work would be completed more then a quarter mile away from the nest patch so there are no effects associated with noise.

- Nordic Guest Services Building- The loss of habitat and disturbance associated with sound is included in the creation of Twilight Parking Lot. This component is not expected to have any negative direct or indirect effects to spotted owl habitat for all alternatives. There is an anticipated positive direct effect during the critical nesting period associated with moving the user service farther away from the nest patch. Also, there is an anticipated positive direct effect during spring nordic ski season associated with reducing the amount of human interactions.

- Sahalie Falls Trail- There are no changes from the existing condition, therefore there are no anticipated direct, indirect or cumulative effects associated with this component.

- All construction activities would take place outside the disruption distance for noise and is **not likely to adversley affect** for northern spotted owls.

The following components of Alternative 3 have direct and indirect effects to spotted owls. The direct and indirect effects include impacts to habitat as well as disturbance associated with construction activities.

- Twilight Parking Lot- In total 13.8 acres of habitat would be permanently removed. This total is comprised of 8.9 acres of suitable habitat and 4.9 acres of capable habitat. The effects of this component are similar to those of Alternative 2 with a difference of 3.3acres more suitable habitat removed in comparison. The increase in acreage would reduce available habitat, but does not put the core or home range below the threshold for take.

- Twilight Equipment Maintenance Yard- This component is the similar to Alternative 2, but has a shorter access road. Direct effects of this component are habitat removal of 2.9 acres with 2.1 acres of suitable and 0.8 capable habitats acres of fragmentation of the landscape, and loss of snag and down wood, and prey habitat.

- Nordic Trails- For this component, the net loss of Nordic trails would be replaced by creating new trail system. The total habitat cleared to create new ski trails would be 3.3 acres. Overall, 1.3 acres of suitable and 2.0 acres of capable spotted owl habitat would be removed within the core area. The distance of approximately 35-feet across would not inhibit dispersal, roosting or foraging capabilities. It is possible that there would be a slight increase in small mammalian prey base through the Nordic trails potentially creating a positive indirect effect.

- Utility Lines- This componenet is the same as Alternative 2, refer to Alternative 2 for direct and indirect effects.

In addition to impacts within the home range, much of the Proposed Action is within the core area for this spotted owl pair. A total of approximately 13.1 acres of suitable habitat would be removed under this alternative when including the access road area of 0.8 acres. The removal of suitable and capable habitat may affect, and is likely to adversely affect, northern spotted owls under this alternative. Enough suitable habitat remains, however, that take on the owl pair is not warranted. Direct effects of this alternative include habitat removal and fragmentation.

Cumulative Effects

The cumulative effects analysis for this alternative are the same as those discussed in Alternative 2 because there are no measurable changes in the direct or indirect effects associated with Alternative 3. The same projects were considered and the same spatial and temporal scales were analyzed.

Elk Meadow Master Plan (Alternative 4) – Direct and Indirect Effects

Overall, the effects of the direct, indirect and cumulative effects are the same for this alternative as described for Alternative 2, including the effects determination. The acres vary slightly, but there is not enough of a difference for there to be a noticeable/measureable impact to the spotted owls. The effects for the Sahalie Falls Hiking Trail are the same for Alternative 4 and 5. This alternative is consistent with the MHM Ski Area Master Plan.

The following components of Alternative 4 have direct and indirect effects to spotted owls. The direct and indirect effects include impacts to habitat as well as disturbance associated with construction activities:

- Twilight Parking Lot- There is a total of 8.0 acres of habitat loss, the amount of suitable habitat removed is 3.6 acres and a total of 4.4 acres of capable habitat. This alternative moves the parking lot closer to the nest patch, the edge of work for this alternative is still outsidethe disruption distance to the nest patch. This is the smallest parking lot proposed and would have the least amount of impact on habitat loss, fragementation, loss of down woody material, and prey changes. It is closer to the nest patch which would directly impact foraging and dispersal available on the south side of the core area. The direct benefit of this alternative is its smaller size and doesn't create as much fragmentation or habitat removal.

- Twilight Maintenance Yard- There is no maintenance yard constructed in this alternative, there is no effect to northern spotted owls because there is no change to the existing condition.

- Sunrise Maintenance Shop- This component proposes to remove 2.5 acres of non-habitat. Because of the elevation of the location of the maintenance lot, there are no direct or indirect impacts to spotted owl habitat and thus no effect. Work would be completed outside the disturbance distance and has No Effect on Spotted owls.

- Nordic Trails- This component does not remove any existing trails and creates no new trail, there is no effect associated with this component. Sahalie Falls Trail- The trail would be relocated creating approximately 630 feet of trail. The trail would be constructed to current standards (24 inch tread and 6 foot clearing width).The new trail construction would require approximately 0.04 acres of ground disturbance and 0.1 acres of disturbance to low level vegetation. Trail clearing is not changing altering major structural components of habitat for spotted owls (e.g. large tree removal). There is no habitat removal associated with trail creation. There are no anticipated direct or indirect effects associated with this component.

- Utility Lines- This component is similar to Alternative 2 except the length for utility lines are less. This component results in no destruction of habitat. Work would occur in already cleared and disturbed areas that do not contribute to habitat for spotted owls. Implementing the PDC would result in no direct or indirect effect because work would occur after the critical nesting period, and no habitat would be lost.

In summary, a total of approximately 4.1 acres of suitable habitat would be removed under this alternative when including the 0.5 acres of suitable removed for the access road. The degradation and removal of suitable and capable habitat may affect and is **likely to adversely affect** northern spotted owls under this alternative.

Cumulative Effects

The overall cumulative effect is similar to Alternative 2. The difference in location and fragmentation in culmination with the other projects does not make a significant difference in the effects call. Under this alternative there is less habitat destruction, and less fragmentation of the

landscape in the core area for the spotted owl. The direct and indirect effects of all components however does not change the **likely to adversley affect** determination.

Elk Meadow (Alternative 5) – Direct and Indirect Effects

Overall, the direct, indirect and cumulative effects are the same for this alternative as described for Alternative 2, including the effects determination. The acres vary slightly, but there is not enough of a difference for there to be a noticeable impact to the spotted owls. The effects for the Sahalie Falls Trail are the similiar to Alternative 4.

The following componenets of Alternative 5 have direct and indirect effects to spotted owls. The direct and indirect effects include impacts to habitat as well as disturbance associated with construction activities

- Twilight Parking Lot- A total of 11.3 acres would be removed for this component. There are a total of 6.0 acres of suitable habitat and 5.3 acres of capable that would be removed. The size of this lot pushes the outside edge of the lot to within 113 yards of the nest patch. The parking lot is closer to the nest and would have a direct negative effect on foraging and roosting habitat in close proximity to the nest patch. Direct loss of down wood, understory, and snags that provide habitat for prey species distribution and abundance in an area that is used as roosting and foraging habitat. This component is closer to the nest patch of the spotted owl and large. It would have a direct impact and loss of habitat in close proximity to the nest patch. However, even with the amount removed this component does not put suitable or dispersal habitat at the threshold levels.

- Twilight Maintenance Yard- Approximately 3.1 acres would be permanently cleared for an equipment maintenance yard (bus and snow equipment parking and a shop building) and access road. Direct effect of this component would be permanent habitat loss of 3.1 acres of suitable spotted owl habitat, fragmentation of the landscape, and loss of snag and down wood prey habitat. Sunrise Maintenance Shop- A 2.5 acre lot would be created under this alternative and is the same lot as proposed in Alternative 4. Because of the elevation of the location of the lot there are no direct or indirect impacts to spotted owl habitat and thus no effect. Work would be completed outside the disturbance distance and has No Effect on Spotted owls.

- Nordic Trails- Approximately a 0.7 acres of suitable habitat would be lost in total for this component. The location and amount of creation is very small and makes it difficult to account for a change to spotted owl habitat. There is a direct effect and loss of habtiat but the effect for the trail creation is limited. Fragmentation was considered in the effects of this, but due to size there might be a positive value for a small openings that allows for roosting and foraging potential.

- Sahalie Falls Trail- The effects of this component are similar to Alternative 4, the change in length does not change the effect call. Much of the trail is rerouted through the existing nordic trail system further reducing any effect to habitat.

- Utility Lines-- This component is similar to Alternative 2 except the length to be created is less. Refer to Alternative 2 for the effects of this component.

In summary, a total of approximately 9.8 acres of suitable habitat would be removed under this alternative. The degradation and removal of suitable and capable habitat may affect, and is **likely to adversely affect**, northern spotted owls under this alternative.

Cumulative Effects

The overall cumulative effect is similar to Alternative 2. Under this alternative there is more habitat removal and it is closer to proximity with the nest patch. There is less fragmentation of the landscape in the core area for the spotted owl due limited creation of new nordic ski trails, this alternative has the largest Twilight Parking Lot and is the closiest alternative to the nest patch. There is a greater direct effect to the immediate foraging and roosting habitat right outside the nest patch because of this. The direct and indirect effects of all components, however, does not change the **Likely to Adversley Affect** effects determination.

Preferred Alternative (Alternative 6) – Direct and Indirect Effects

This alternative is comprised of components from other alternatives to create the preferred alternative.

The following components of Alternative 6 have no direct or indirect effects to spotted owls.

- Left- and Right-Turn Lanes- There is no direct or indirect effects related to the creation of the left- and right-turn lanes, because habitat is not being removed. This includes the wetland relocation as well. Work is taking place within 50 feet of the road prism on either side and activities would take place outside the disturbance and disruption distance, this component for all alternatives is **not likely to adversley affect** for northern spotted owls and will not be analyzed further for this species.

- Sunrise Vehicle Maintenance Shop- This component is the same location and lot as Alternative 4. A vehicle maintenance shop would be constructed on 2.5 acres on the north side of the existing Sunrise Parking Lot. No access road would need to be constructed. There is no direct, indirect or cumulative effect for this component because work is done above the elevation for spotted owl habitat and work would be completed more then a quarter mile away.

- Nordic Guest Services Building- The loss of habitat and disturbance associated with sound is included in the creation of Twilight Parking Lot. This component is not expected to have any negative direct or indirect effects to spotted owl habitat for all alternatives. There is a positive direct effect by moving the user service farther away from the nest patch during the critical nesting period during spring use.

- Sahalie Falls Trail- There are no direct or indirect effects associated with this component because there are no changes from the existing condition.

- All construction activities for all action alternatives would take place outside the disruption distance for noise and is **not likely to adversley affect** for northern spotted owls.

The following components of Alternative 6 have direct and indirect effects to spotted owls. The direct and indirect effects include impacts to habitat as well as disturbance associated with construction activities.

- Twilight Parking Lot- This component is same as Alternative 2. Direct effects of this component are permanent habitat removal and fragmentation within the core area and home range for the spotted owl, and altering prey distribution and abundance. Under this alternative a total of 9.4 acres would be removed in order to construct a parking lot, an access road, a storm water facility and provide for snow storage. The Twilight Parking Lot removes 5.6 acres of suitable habitat and 3.8 acres of capable habitat. There are two access roads being created in spotted owl habitat. One for the Twilight Parking Lot and the Twilight Maintenance Yard, there is a total of 0.9 acres of suitable habitat being removed. Loss of down wood, understory, and snags that provide habitat for prey species would impact spotted owls by altering prey species distribution and abundance in an area that is used primarily as roosting and foraging habitat.

- Twilight Equipment Maintenance Yard- This component is the same as Alternative 2. Approximately 2.9 acres would be permanently cleared for an equipment maintenance yard (bus and snow equipment parking and a shop building) and access road. Direct effect of this component would be permanent habitat loss of 2.1 acres of suitable and 0.8 acres of capable spotted owl habitat, fragmentation of the landscape, and loss of snag and down wood prey habitat.

- Nordic Trails- This component is same as Alternative 3. The net loss of Nordic trails would be replaced by creating new trail system. The total habitat cleared to create new ski trails would be 3.3 acres. Overall, 1.3 acres of suitable and 2.0 acres of capable spotted owl habitat would be removed within the core area. The distance of approximately 35-feet across would not inhibit dispersal, roosting or foraging capabilities. It is possible that there would be a slight increase in small mammalian prey base through the Nordic trails potentially creating a positive indirect effect.

- Utility Lines- This component is the same as Alternative 2. The component would result in no destruction of habitat. Work would occur in already cleared and disturbed areas that do not contribute to habitat for spotted owls.

In addition to impacts within the home range, much of Alternative 6 is within the core area for this spotted owl pair. A total of approximately 9.9 acres of suitable habitat would be removed under this alternative when including the access road area of 0.9 acres. The removal of suitable and capable habitat may affect, and is **likely to adversely affect**, northern spotted owls under this alternative. Enough suitable habitat remains, however, that take on the owl pair is not warranted. Direct effects of this alternative include habitat removal and fragmentation.

Cumulative Effects

The cumulative effects analysis for this alternative are the same as those discussed in Alternative 2 because there are no measurable changes in the direct or indirect effects associated with Alternative 6. The same projects were considered and the same spatial and temporal scales were analyzed.

Summary of Effects to Northern Spotted Owls

Table 3-65 shows the amount of suitable habitat removed for each component that effects habitat under each alternative. It also shows percentage of suitable habitat left in the core area and home range for each alternative. Data shows every alternative is above take thresholds of 50 percent suitable habitat available in the core area and 40 percent in the home range.

Table 3-65: Suitable habitat removal for each alternative and percent suitable remaining in core areas and home ranges after reduction of suitable habitat.

Project Component	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Twilight Parking Lot Total Clearance	5.6	8.9	3.6	6.0	5.6
Twilight Maintenance Yard	2.1	2.1	NA	2.5	2.1
Access Roads	0.9	0.8	0.5	0.6	0.9
Nordic Trails	1.0	1.3	NA	0.7	1.3
Total Suitable Habitat Acres Removed	9.6	13.1	4.1	9.8	9.9
% Suitable Habitat available (Core area/ Home Range)	(64.4/50.8)	(63.7/50.7)	(65.5/51)	(64.4/50.8)	(64.3/50.8)

Under all alternatives, suitable habitat would be reduced in the core and home range for the spotted owl pair that are being impacted. There is **likely to adversely affect** call for this project across all alternatives because of the suitable habitat being removed. The amount removed when comparing all alternatives, however, never puts the habitat below USFWS thresholds for take. There are no disruption impacts from noise because work for all alternatives is outside the disruption distances.

R6 Sensitive Species

Wolverine

No Action Alternative (Alternative 1) - Direct and Indirect Effects

Human disturbance would continue from recreational and administrative uses. There would be no habitat impacted and no change in the use patterns of wolverines with this alternative. Therefore, this alternative would have **no impact** to wolverines

All Action Alternatives (Alternatives 2, 3, 4, 5 and 6) - Direct and Indirect Effects

All action alternatives are being analyzed the same way because wolverines have a large home range (62 to 560 square miles). Foraging and denning opportunities would still be available in the portion of the home range outside of the project area and Permit Area. Because wolverines are highly sensitive to human presence, the disturbance associated with the connected actions of all alternatives could temporarily displace foraging wolverines. Because of the existing recreation at MHM, it is unlikely that wolverine are denning in the project area. Since there is little information on den sites in Oregon, it is not known if their dens are associated with trees. It is likely that the dens in Oregon would more closely resemble the dens in Idaho that were associated

with trees than the dens in Alaska that were not. Because the proposed projects are near areas of high human influence the proposed connected actions to alternatives would likely not reduce the available denning habitat. Due to the large home ranges of the wolverine, it is unlikely that the action area would impact more than one male or one female with kits. The proposed projects **may impact individuals, but are not likely to impact populations, nor contribute to a potential loss of viability of this species.**

Cumulative Effects

The spataial scale for wolverines is the Permit Area, consideration was given to past, current projects, and those in the foreseeable future in relation to the current conditions. Habitat removal within the Permit Area is not likely to have a measurable impact on habitat available for wolverines due to the vicinity of human presence. Projects that were analyzed as a cumulative effect include: Avalanche control, Highway 35 betterment, teacup grooming, buttercup lift improvements, blue grass ridge fire, stadium lift realignment, techniques, including the Howitzer and hand charges, which can be heard throughout the Upper Hood River Valley.

The immediate short-term cumulative effects from these are the increase in summer presence by humans and thus disturbance to foraging behavior of prey species. When considering cumulative effects to wolverines consideration was given to habitat that is most likely to be occupied. This habitat is higher in the permit area or more likely farther away from user services like the lodge, nordic center, etc. The direct effect this noise can have on wolverines is unknown, but with noise from heavy equipment and the increase in recreational opportunities, there is less opportunity for future re-colonization of the area to historical levels. A long term effect is global warming which is predicted to effect the long term ability of the Mt. Hood and surrounding areas to be habitat in the future.

Peregrine Falcon

No Action Alternative (Alternative 1) - Direct and Indirect Effects

Human disturbance would continue from recreational and administrative uses and these levels would not change. There would be no habitat impacted with this alternative. Therefore, this alternative would have **no impact** to peregrine falcon.

All Action alternatives (Alternatives 2, 3, 4, 5, and 6) - Direct and Indirect Effects

All action alternatives are being analyzed the same way because the Peregrine nest site is over a mile away and the effect of all alternatives is assumed to be the same. Peregrine falcons are sensitive to human presence, so the disturbance associated with the actions of all alternatives could temporarily disturb nesting birds. Potential disruption would only take place during construction activities and potentially impact no more than one breeding pair for one breeding season. No nesting habitat would be directly impacted by the Proposed Action and there would continue to be sufficient foraging habitat adjacent to the project area within the territory of a nesting pair. Foraging habitat is not being removed due to the feeding techniques of peregrines. Foraging opportunities may be altered during the increase in human presence that would occur during construction at the lower elevations of the Permit Area. There is an indirect effect of prey species dispersal and distribution that would be altered with the proposed actions. The proposed projects **may impact individuals, but is not likely to impact populations, nor contribute to a potential loss of viability of this species.**

Cumulative Effects

The spatial scale for peregrines is the project area and within close vicinity to the presumed nest site, temporaly consideration was given to past, current and reasonably foreseable future projects and possible impacts. These projects could contribute to disturbance to peregrine falcons: Highway 35 betterment (including White River bridge replacement, Clark Creek wetland enhancement and snow park decommissioning), Meadows Creek Highway 35 and Teacup Road culverts,Teacup grooming activities, Blue Grass Ridge fire, Stadium Lift realignment (including Blue Wetland restoration and trash rack culvert replacement), Buttercup Lift improvements, Annex Wetland restoration at Sunrise (i.e., paving on Sunrise Parking Lot NEPA), General on-going road maintenance including winter road treatments, General on-going ski area activities (e.g., ski run maintenance, hazard tree removal, and sign replacement), Sahalie Falls bridge stabilization, Pre-commercial thinning, Avalanche control. The primary impacts would be disturbance, no nesting habitat would be impacted and work is done below eyries so impacts during the nesting season is presumed prey dispersal and forage habitat. Foraging habitat would be removed and has been, but it is not considered limited in the project area or on the District. As such the cumulative effects associated with this project **may impact individuals, but are not likely to impact the population.**

Survey and Manage (Great Gray Owl)

No Action Alternative (Alternative 1) - Direct and Indirect Effects

There would be no noise disturbance or habitat impacted with this alternative. The number of snags that provide habitat would remain unaltered while allowing for larger trees and snags to be recruited as perch habitat. With the No Action Alternative, there would be no sound related disturbances associated with the parking lot or other construction activities. Therefore, this alternative would have **no impact** to great gray owls. Due to maintenance of ski runs, openings would remain available for foraging.

All Action Alternatives (Alternatives 2, 3, 4, 5, and 6) - Direct and Indirect Effects

The effects of all action alternatives are being analyzed the same because the impacts to great gray owls is the same. The nest tree size for great gray owls in Oregon ranges from 23 to 31 inches in diameter and while the removal of large diameter trees could impact the number of available nest trees. Since great gray owls hunt by perching in trees or snags, tree removal would reduce the number of trees available for perching. If great gray owls are pesent they would likely be nesting in the lower elevations of the project area, where higher quality nesting habitat is located. The eastern portion of the permit area has some openings from timber harvest and hood river meadows and the higher elevations in the Permit Area also include suitable habitat. Great gray owls are sensitive to human presence, so the disturbance associated with the action alternatives construction activities could temporarily displace nesting birds and potentially impact no more than one breeding pair for one nesting season. The likelihood of impacts are less due to their scarcity and habitat use. The proposed project **may impact individuals, but is not likely to impact populations, nor contribute to a potential loss of viability of this species.**

Cumulative Effects

The Permit Area is the spatial boundary for analyzing cumulative effects. Projects that were done in the past, current and foreseeale future were analyzed for great gray owls. Potential impacts to great gray owls include hazard tree removal within the Permit Area by reducing available nesting trees. Hazard tree removal has the potential to remove large snags, however due to

management practcices trees should only be removed when they pose a threat to human life or safety. These would be in areas of use or high use of humans where great grays are less likely to be located. Other direct effects include disturbance by noise from construction work, maintenance, avalanche control, and fire management techniques. Overall, habitat is limited for great gray owls throughout the District. However, habitat within the Permit Area is available and in general good condition for great gray owl use. The proposed projects and those that have the potential to occur in the near future are not proposed in the meadow systems where great grays rely heavily on. The projects impacts are sound disturbance and **may impact individuals, but is not likely to impact populations, nor contribute to a potential loss of viability of this species**

Management Indicator Species

Mule Deer and Elk

No Action Alternative (Alternative 1) - Direct and Indirect Effects

No cover would be lost and no forage would be gained with this alternative. No additional disturbance would take place with this alternative. Road densities would remain unchanged and would be below the Forest Plan Standard of 2.5 miles per square mile.

Action Alternatives (Alternatives 2, 3, 4, 5, and 6) - Direct and Indirect Effects

The action alternatives would remove cover and foraging habitat for elk and deer. It would also further fragment the landscape impacting migration routes and connectivity throughout the project area and routes to other key habitat. This is common among all alternatives.

Removal of trees for nordic ski trails would slightly increase the amount of forage, but is not expected be a major positive direct effect . Since the project area is used by deer and elk in the summer, cover is comprised of hiding and thermal regulation. The loss of cover and increase in forage is likely to change the distribution and/or use by deer and elk.

Construction activities could potentially disturb animals that are in the area at the time of implementation. The project area is comprised of summer range. Disturbance that occurs during this season could potentially displace animals, and has the potential to affect the health of individuals if the disturbance occurs near active calving sites. The potential disturbance is predicted to be small in scale, but permanent in nature. The project is not predicted to cause a measurable reduction in the current local population size for deer or elk. No additional main roads would be created, therefore road densities would remain unchanged and would be below the Forest Plan Standard of 2.5 miles per square mile for inventoried summer range.

Alternative 2- This alternative fragments the area into the north eastern portion of the Permit Area, which currently is used regulary by deer and elk. This would likely effect forage areas due to the current nordic trails being covered, and reduce security habitat and potentially impact migration from the Teacup area into the eastern portion of the project area. Migration from the north is not expected to be impacted by any of the alternatives. The larger rectangular parking lots reduce cover and are potentially creating an east to west area of avoidance due to the pavement. The new nordic trails would likely create some forage, but would further fragment and reduce cover. The Sunrise Maintenance Shop would not directly effect deer and elk. Due to its location for all alternatives specifically deer and elk would not likely use the area because of its proximity to human disturbances during the spring and summer months. There is a total of 18.1 acres of habitat impacted with this alternative.

Alternative 3- This alternative is very similar to Alternative 2. The major difference is the nordic trail creation. The direct effect of trail creation inbetween the Hood River Meadows (HRM) lot and proposed Twilight Parking Lot may make deer and elk feel less secure, and limit the dispersal through that area. An indirect effect would be the creation of some foraging habitat over time in the new nordic trails. There is a total of 24.7 acres of habitat impacted with this alternative.

Alternative 4- This alternative keeps the footprint of the parking lot closer to other infrastructure. It also has a large enough space between the HRM Parking Lot and Twilight Parking Lot that provides for a travel corridor for elk and deer. It is also a benefit that the foot print of the projects are closer to other disturbances associated with the ski area, this lessens the amount of fragmentation. It also means other areas to the northeast would not be distrubed, which limits the direct impacts of disturbance and keeps security habitat in that portion of the permit area in tack. This alternative also keeps the existing forage, calving and rearing habitat unaltered or effected. There is a totatl of 11.6 acres of habitat impacted with this alternative.

Alternative 5- The Twilight Parking Lot in this alternative is very large and takes up most of the space between the existing HRM lot and creation of the new lot. Migration through that portion would not likely occur. There is an overal benefit of keeping the footprint closer to other disturbances increases the security habitat that is in the north eastern portion of the Permit Area. This alternative also keeps the existing forage, calving and rearing habitat unaltered or effected but to a lesser degree then alternative 5 due to it being larger. There is a totatl of 18.1 acres of habitat impacted with this alternative.

Alternative 6- The preferred alternative has components from Alternative 2, 3, and 4. The Twilight Parkling Lot is the same as Alternative 2 and would have the same effects as described above. The nordic trails from Alternative 3, and Sunrise Maintenance Building of Alternative 4 effects would have the same effects as above. There is a total of 19.5 acres of habitat impacted with this alternative.

Since deer and elk use the area primarily in the spring and summer, construction activities for the alternatives would take place when deer and elk are present. The action alternatives would have a minimal impact on the species because the construction activities are short-term (1 year), the majority of the Permit Area is left in tack, and there is habitat adjacent to the Permit Area. A max habitat removal of 24.7 acres for deer and elk is very little when considering the land base that they use and that deer and elk habitat are not limited for these species in the Permit Area or locally on the District.

Cumulative Effects

Cumulative effects were bound spatially by the district boundary to the West and East, south to Highway 26, and North to Little John Sno-Park. Temporal bound was within the last 10 years, current and reasonably foreseeable future. Recreational activities, timber harvest, parking lot construction, and Highway reconstruction all have the potential to impact deer and elk through disturbance and/or habitat changes. There have been several large fires recently that wrap around the Northwestern portion of the Mt. Hood: all are excellent forage habitat for deer and elk. Due to current timber practices and management, and road decommissioning habitat is increasing in value. Because of the vast tracks of habitat that are available to deer and elk this project and the relatively small amount of habitat removal would not push deer and elk into a declining state. As such, there are no cumulative effects that would result from this project.

American Marten

No Action Alternative (Alternative 1) - Direct and Indirect Effects

No habitat would be impacted with this alternative. Snag and tree densities which the marten depends on would remain unchanged in the short-term. In the long-term, additional snags would be recruited from the live trees in the project area.

All Action Alternatives (Alternatives 2, 3, 4, 5, and 6) - Direct and Indirect Effects

All action alternatives are being analyzed the same because the effects to the species are presumed similiar. Location of alternatives are different but documentation of where martens are using, denning, foraging, etc is unknown, the assumption is they are using the project areas. Tree removal would reduce snags, down wood, live trees, and canopy closure for this species. This habitat provides both denning and foraging opportunities, which would be reduced under the action alternatives. The proposed project decreases forested areas and increases open areas as well as permanently removes habitat. The impacts to marten would be similar to clear cut activities, but to a lesser degree. Because of the relatively small home range of this species (0.4 to 4 square miles), the tree removal may have an impact on an individual's ability to forage and locate denning sites. It is not anticipated that this would impact more than 2 individual's home ranges, although this impact would be long-term since the tree removal is irretrievable loss.

Since martens may inhabit areas with high levels of human use, the disturbance caused by construction activities may not have a significant impact on martens unless the disturbance is directly adjacent to a denning or foraging area. Because of the small home range size, disturbance may prevent an individual from foraging or denning in the area for the duration of construction activities. This impact would be short-term and last only one season. All action alternatives **may impact individuals, but is not likely to impact populations, nor contribute to a potential loss of viability of this species**. The proposed project does not impact any American marten habitat areas (B5) designated in the Mt. Hood Forest Plan.

Cumulative Effects

Cumulative effects were analyzed at the Permit Area level, and consist of MHM completed projects, Forest Service projects, current projects and those in the foreseeable future. Past ski run clearance and maintenance and chair lift construction have reduced the amount of suitable habitat for marten in the Permit Area. Other projects also include those that remove trees, such as timber harvest, parking lot construction, Highway reconstruction, and hazard tree removal, also have the potential to reduce snags and down wood on the landscape which are used by marten for denning and foraging. Management practices help to keep snags that are within the Permit Area and project areas that don't pose a human safety risk. Those that are fell stay in the Permit Area as down wood and helps to create important habitat for marten. Old clear cuts, timber work, and ski run clearance may act as foraging habitat for marten during the summer. The lower portion of the Permit Area is mature forest habitat that is relatively in tact. Because marten are easily habituated to human presence the culmination of projects that have occurred **may impact individuals, but is not likely to impact populations, nor contribute to a potential loss of viability of this species.**

Snag and Down Log Associated Species

No Action Alternative (Alternative 1) - Direct and Indirect Effects

Snags and down logs would remain unchanged in the short-term. In the long-term, additional snags and down logs would be recruited from the live trees in the project area.

All Action Alternatives (Alternatives 2, 3, 4, 5, and 6) - Direct and Indirect Effects

Snag and down logs would be reduced in the project area. In the long-term, the removal of trees would prevent further recruitment of snags and down wood. The current condition for large snags in the watershed is comparable to historic conditions for 2-10 and 12-14 snags per acre, but is lacking in 10-12 snags per acre, more than 14 snags per acre, and high density patches of large snags (Figure 3-20). Twice as much of the watershed now has zero snags per acre compared to historic conditions. Implementation of this project would result in the loss of snags greater than 12 inches in dbh (diameter at breast height). This number of snags in not measurable at the watershed scale, therefore, there would be no substantive reduction in the percentage of biological potential being provided for species dependent on snags and down wood.

The current condition for this habitat type was taken from the estimates in DecAID advisor. These estimates included all disturbances through 2006. The Gnarl Ridge Fire within this watershed was in 2008 after the analysis was completed for this habitat type. Therefore, the current condition for the category of 26+ snags per acre may be underestimated if a portion of the fire was within the montain mixed conifer habitat type in this watershed.

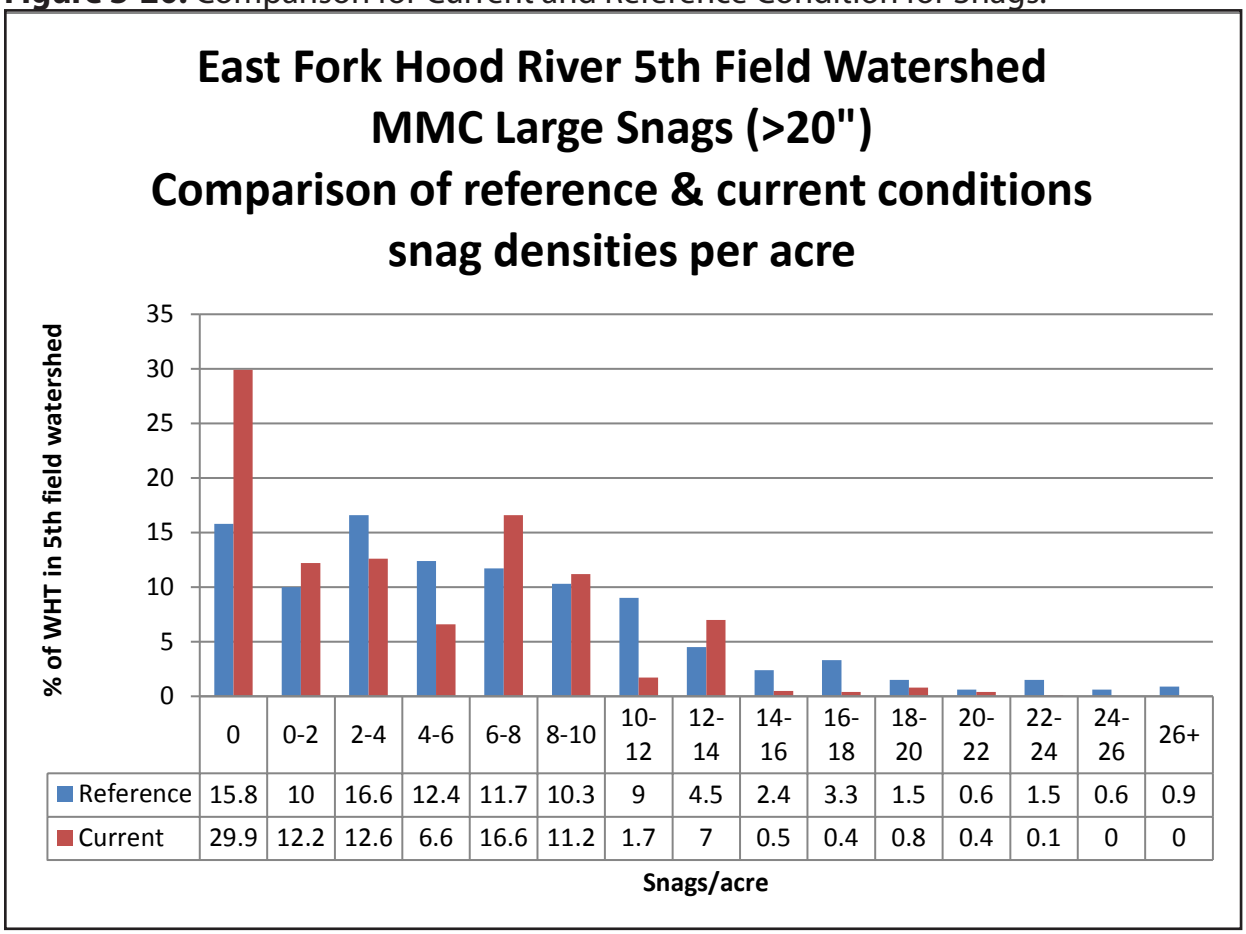
Habitat removal ranges from a total of 11.4 to 22.0 acres. The project area currently has large diameter trees, snags and down wood present. Analyzing these acreage reductions at the watershed scale make the effects for the projects un-measurable for snag and down wood. Currently about half of the trees in the project area are large enough to produce snags of the desired size since they are slow growing at this altitude (22 inches diameter, Forest Plan Standard FW-234). The Forest Plan Standards also indicate that stands should have 6 logs per acre in decomposition class 1,2, and 3 and that they should be at least 20 inches in diameter and greater than 20 feet in length. However, FW-240 allows for an exception to the snag and down log Standards and Guidelines in A11 Winter Recreation Areas.

Cumulative Effects

Cumulative effects were analyzed at the watershed scale to coincide with the DecAID analysis. Past timber harvest, ski run clearance and maintenance, and chair lift construction have reduced the amount of snags and down wood in the project area and permit areas. Other projects in the watershed that remove trees, such as timber harvest, parking lot construction, Highway reconstruction, and hazard tree removal, also have the potential to reduce snags and down wood on the landscape. The watershed is currently deficient in high density patches of large snags, and removal of trees and snags would further reduce the ability of the landscape to provide for this habitat type. Due to the Gnarl Ridge Fire the amount of large snags on the landscape is likely more then what was predicted by DecAID. The amount of large snags that are going to be removed in the project areas is predicted currently < 20, this amount at the watershed scale is very small. The abilitiy for this amount to be recruited in the future is likely due to management practices that leave snags standing when not near ski runs or other structures that could pose a threat to human health or safety. The reduction of snags in the past, currently, and proposed is not likely to limit snag availability for snag dependent species. Fire has played a major role in the

creation of snags and management practices is not likely to cause depletion of habitat available for snag dependent species.

Figure 3-20: Comparison for Current and Reference Condition for Snags.



	0	0-2	2-4	4-6	6-8	8-10	10-12	12-14	14-16	16-18	18-20	20-22	22-24	24-26	26+
Reference	15.8	10	16.6	12.4	11.7	10.3	9	4.5	2.4	3.3	1.5	0.6	1.5	0.6	0.9
Current	29.9	12.2	12.6	6.6	16.6	11.2	1.7	7	0.5	0.4	0.8	0.4	0.1	0	0

Neotropical Migratory Birds

No Action Alternative (Alternative 1) - Direct and Indirect Effects

There would be no alteration of habitat, therefore, no migratory bird species would be impacted by this alternative.

All Action Alternatives (Alternatives 2, 3, 4, 5 and 6) - Direct and Indirect Effects

All alternatives are lumped because habitat that is lost is similar in type. Locations are different but overall habitat type is the same. Neotropical migrant species impacted would be limited to forest species such as Nashville warbler, Hermit thrush, and brown creeper. Tree removal for all alternatives would reduce the amount of habitat available within the Permit Area. These species rely on trees and shrubs within the project area for nesting and foraging habitat. The amount of tree removal for all alternatives would be small when compared to the range of the species and habitat available within the watershed and on the District.

Cumulative Effects

The spatial scale for effects is the watershed level, and temporaly bound by less then 10 years ago, current and reasonably foreseable projects. Other projects in the watershed that have the potential to impact migratory birds by tree removal include: Highway reconstruction, hazard

tree removal, pre commercial thinning, and Blue Grass Ridge Fire. In some cases, thinning may enhance habitat for a number of migratory species and provides habitat for some species that are rare or absent in un-thinned stands. However, some species of migratory birds have been shown to decline following thinning. The effects of thinning in mid-successional stands would most likely have a combination of positive, neutral, and negative impacts on migratory bird use within the stands depending on which species are present. Open habitat that would be created could be beneficial for early seral species like the Nashville warbler and Williamson's sapsucker. The hermit thrush and brown creeper would be negatively impacted by habitat removal. Highway re-alignment and parking lot construction removed habitat for early, mid, and late successional nesting migratory birds. The watershed has habitat available that includes all seral stages, the projects listed and analyzed don't limit habitat available for neotropical migrants.

3.7.4 Consistency Determination

This project is consistent with all applicable components of the Mt. Hood Land and Resource Management Plan (Forest Plan) as amended, including Standards and Guidelines, Northwest Forest Plan, and Survey and Manage 2001 Record of Decision. The project is also consistent with the Northern Spotted Owl Recovery Plan. PDC and mitigation are consistent with the MHM Master Plan. The Master Plan PDC and mitigation are to be implemented in conjunction with the ones created under this planning process.

3.7.5 Summary of Effects By Action Alternative

The following summary outlines the primary anticipated effecs on wildlife species and their habitat for the action alternatives. The summary is grouped by proposed activity and includes species-specific information for all action alternatives:

- The left- and right-turn lanes and the associated wetland relocation are not expected to have negative impacts on any of the species analyzed.

- Sunrise Vehicle Maintenance Shop- This component within all the action alternatives would not impact spotted owls. Proposed work would be done above the elevation for spotted owl habitat, and is outside disruption and disturbance distances. Mule deer and elk are not likely to use any of the proposed locations for the lot as a primary foraging or cover areas due to the close proximity to other facilities.

- Twilight Parking Lot, Twilight Equipment Maintenance Yard, and Nordic Trails- Under all alternatives, suitable habitat would be reduced in the core and home range for the spotted owl pair that are being impacted. There is likely to adversely affect call for this project across all alternatives because of the suitable habitat being removed. The amount removed when comparing all alternatives, however, never puts the habitat below USFWS thresholds for take. There are no disruption impacts from noise because work for all alternatives is outside the disruption distances. Alternatives 2, 3 and 6 keep the majority of the construction and removal farther from the spotted owl nest patch. Alternatives 4 and 5 are in closer proximity, but outside the disruption distances. Alternative 4 has the least amount of impacts because of smaller lot size and there is no new creation of Nordic trails keeping more of the project in the existing condition.

- Twilight Parking Lot, Twilight Equipment Maintenance Yard, and Nordic Trails- Mule Deer and Elk would be impacted by the creation of these components in all action alternatives. Alternatives 4 and 5 are closer to the other summer disturbances and allows for more security in the north eastern portion of the permit area, while Alternatives 2 & 3 spread the components out and fragment more of the permit area, they also potentially impact migration routes in the east to west direction due to the rectangular forms of the lots creating a line of potential avoidance due to pavement when including the HRM Lot and ODOT sand shed.

- Utility lines, Sahalie Falls Trail, and Nordic Guest Services Building- These components do not have any major impacts for any of the species considered in this report. Habitat is not removed or altered, and thus is not a major concern for wildlife species.

- For all action alternatives, there are no major anticipated effects for peregrine falcons, wolverine, or great gray owls. Habitat for these three species is not suspected to be impacted in this area and not likely to be where human use is as high.

- American Marten are known to use the area and are habituated to humans. The amount of potential key habitat being removed for this component, however, is small in comparison to the habitat available for this species.

- Snag and down log associated species would lose habitat, but at the project and watershed scales are not impaired overall.

- Neotropical migratory birds would lose some habitat associated with the action alternatives. The amount of tree removal for all alternatives, however, is small when compared to the habitat available within the watershed and on the District.

3.7.6 Incomplete and Unavailable Information

All information needed to perform this analysis is complete and available.

3.8 Botany

More information is available in the project record including the full botany analysis file, and biological evaluation as part of the Botany Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.8.1 Background

R6 Sensitive Species

The Regional Forester's list of Special Status Species includes Federally listed, Federally proposed, Sensitive, and Strategic Species. Collectively, these species are referred to as Special Status Species. There are no federally listed or federally proposed species within range of the proposed project (i.e., habitat is not present); as such they are **not** included in this report.

Strategic species were included in the January 2008 update of the Regional Forester Sensitive and Strategic Species (RFSSS). Strategic Species are not considered Sensitive under Forest Service Manual (FSM) 2670 and do not need to be addressed in Biological Evaluations. As such, they will not be discussed in this report.

The updated Regional Forester's List of Special Status Species was formally issued to field units on December 9, 2011. The memo states: "The updated RFSSS list will apply to all projects *initiated* on or after the date of this letter. Projects initiated prior to the date of this letter may use the updated RFSSS list or the RFSSS list that was in effect when the project was initiated. *Initiated* means that a signed, dated document such as a project initiation letter, scoping letter, or Federal Register Notice has been completed for the project." (http://www.fs.fed.us/r6/sfpnw/issssp/agency-policy/).

The proposed project was initially proposed by Mt. Hood Meadows in 2009. The most recent scoping letter is dated June 29, 2011. Surveys were conducted in November 2008 and August through early November 2011 using the 2008 Region 6 Sensitive species list; therefore, the 2008 R6 Sensitive species list applies to this biological evaluation.

Survey and Manage Species

The Forest Service is currently implementing the Northwest Forest Plan 2001 Record of Decision as modified by the 2011 Settlement Agreement. Species listed in the 2001 ROD are referred to as "Survey and Manage species" (httpp://www.blm.gov/or/plans/surveyandmanage/).

An official memo, dated 7/21/2011, was transmitted to Forest Service and Bureau of Land Management units within the range of The Northwest Forest Plan (NWFP) setting aside the 2007 Record of Decision (ROD) and directing the agencies to apply the January 2001 ROD as modified by the 2011 Survey and Manage settlement agreement[3] . The memo states, "For projects with signed RODs, Decision Notices, or Decision Memoranda from December 17, 2009, through September 30, 2012, the agencies can use either: 1) the list of *Survey and Manage* species in the 2001 ROD (Table 1-1, Standards and Guidelines, pages 41-51), or 2) the list of *Survey and Manage* species and associated species mitigation from the 2011 Settlement Agreement; for projects after Sept 30, 2012, the 2011 Settlement Agreement list must be used."

The 2001 ROD species list was used for surveys conducted in the proposed Mt. Hood Meadows Parking Improvements Project area during November 2008 and August - November 2011, therefore the 2001 ROD species list applies to this report.

The 2001 ROD requires pre-disturbance surveys for Rare and Uncommon Survey and Manage species in Categories A and C (SG-7, SG-10, and Table 1-1 SG41-51) if habitat-disturbing activities are likely to have a negative impact on the species and habitat. Survey protocols are utilized to determine the appropriate habitat for each species.
"Equivalent Effort" surveys for Survey and Manage Category B species are required in the old growth habitat to be disturbed *unless* Strategic Surveys have been completed in the province that encompasses the project area (ROD SG-9). In the Eastern Oregon Physiographic Range that encompasses the project area on the Mt. Hood National Forest (2001 ROD SG-2) Strategic

3- 7/21/2011 EMS TRANSMISSION 07/26/2011 FS-Memorandum BLM-Instruction Memorandum No. OR-2011-063 IM-OR-2011-063

Surveys have only been completed for two bryophytes (*Rhizomnium nudum* (moss), and *Tritomaria exsectiformis* (liverwort)[4] but have not been completed for Category B lichens and fungi within range. There are no Survey and Manage Category B Vascular plant species listed in the 2001 ROD.

Major components of old growth forest, as defined in the 2001 ROD (SG-79), are not present in the proposed project area; therefore, Equivalent Effort surveys for Category B species are not required. Definitions of old growth forest are discussed below. A detailed description of habitat in the project area is discussed under Existing Conditions.

According to the 2001 ROD old growth forests are defined as "…a forest stand usually at least 180 to 220 years old with moderate-to-high canopy closure; a multi-layered, multi-species canopy dominated by large overstory trees; high incidence of large trees, some with broken tops and other indications of old and decaying wood (decadence); numerous large snags; and heavy accumulations of wood, including large logs on the ground (ROD SG pg. 79).

There is no *official* definition for old-growth *mountain hemlock* stands such as those present in the proposed project area. A definition for old-growth mountain hemlock was proposed by David Peter of the Pacific Northwest (PNW) Research Station in Olympia in 1992, but it has not been officially adopted. This definition of old-growth mountain hemlock goes as follows: (1) stand must be >230 years old, (2) contain at least 11 trees/acre greater than or equal to 21 inches dbh, and (3) contain at least 4 snags/acre greater than or equal to 15 inches dbh. And Peter adds this important caveat: "It is important to look at the whole stand when identifying old growth. Use of plot data is not adequate in all cases. Old-growth stands tend to be patchy with regenerating trees in the openings. Snags and large trees are often unevenly distributed throughout the stand. This complicates sampling and introduces an element of noise into the data." (Peter, D. 1992).

3.8.2 Analysis Assumptions and Methodology

Analysis Assumptions

The effects analysis in this report is based on the assumption that the final area of actual project disturbance would be the same as the proposed areas of disturbance described in Chapter 2 of the DEIS (i.e., final acreages and specific project perimeters proposed for disturbance accurately reflect the description).

Survey guidelines for R6 Sensitive species and survey protocols for Survey and Manage botanical species are not intended to cover 100 percent of a project area; individuals might be missed between survey transects. Generally, if a species is not found during surveys through all suitable habitats in a project area it is reasonable to assume the target species are not present for various reasons. Species that have suitable habitat in the Mt. Hood Meadows Parking Lot Improvements project area, but were not detected during surveys, are discussed under Existing Conditions – Field Surveys.

4- EMS TRANSMISSIONBLM-Instruction Memorandum No. OR-2006. Category B Lichens and Bryophytes Where Strategic Surveys are Considered Complete (March 2006)

Methodology – Forest Service Direction

R6 Sensitive Species - The 5-Step Biological Evaluation Process

Forest Service policy requires a 5-step biological evaluation process to "assure that management activities do not jeopardize the continued existence of sensitive species or result in an adverse modification of their essential habitat" (FSM 2670.3). The 5-step process consists of: 1) Pre-field review of existing information; 2) Field reconnaissance if sensitive species or habitats are determined to be present and may be affected by proposed project activities; 3) An evaluation of project effects on sensitive species and habitats; 4) An analysis of the significance of the project's effects on local and entire populations of species; and 5) A biological investigation if needed (due to lack of information). A determination of No Impact for sensitive species can be made at any step in the process, at which time the biological evaluation is complete.

Survey and Manage Species – 2001 ROD Standards and Guidelines

Survey and Manage Categories discussed in this report are: Category A = Pre- disturbance surveys are practical and must be conducted if suitable habitat is present, and manage all known sites; Category B = Equivalent Effort surveys required in old growth habitat unless Strategic Surveys have been completed, and manage all known sites; Category C = Pre- disturbance surveys are practical and must be conducted if suitable habitat is present, and manage high-priority sites; Category D = Pre-disturbance surveys not practical or not necessary, manage all known sites until high-priority sites can be determined; Category E = Pre-disturbance surveys are not required, status undetermined, manage all known sites until a determination is made whether the species meets the basic criteria for Survey and Manage (ROD SG pages 7-14).

To help determine the need for a survey based on site-specific information, the 2001 ROD suggests "…line officers should consider the probability of a species being present on the project site as well as the probability that the project might cause a significant negative effect on the species habitat or the persistence of the species on the site" (ROD SG-22, pg. 2).

Methodology – Prefield Review, Field Surveys, and Management of Known Sites

Determine the Need for Pre-disturbance Surveys: Prior to field surveys an office review of existing information is conducted to determine which R6 Sensitive species and Survey and Manage species are in range of the Mt. Hood National Forest, and if known sites and/or suitable habitats are present in the project area. To help determine which species are within range of the proposed project area and if pre-disturbance surveys are needed the following process is used.

Review Existing Data:

1. Review NRIS (Natural Resource Information System) known site data/ habitat information for R6 Sensitive and Survey and Manage species that are documented and/or suspected to occur on or within range of Mt. Hood National Forest. Review most current official Survey and Manage species list and information on http://www.fs.fed.us/r6/sfpnw/issssp and http://www.blm.gov/or/plans/surveyandmanage which includes survey protocols, Survey and Manage species fact sheets for vascular plants, bryophytes, lichens, and fungi, and Conservation Assessments and Management Recommendations (which also include habitat requirements for vascular plants, lichens, bryophytes, and fungi). Additional infor-

mation available for review includes: Current Vegetation Survey (CVS) plot data, Random Grid data, Purposive Surveys in the vicinity of the Mt. Hood National Forest, local experts, and local university herbaria.

2. Identify areas of suitable habitat in the project area for R6 Sensitive species and Survey and Manage Category A and C botanical species that require pre-disturbance surveys (ROD SG-7, 8, 10); and for Category B species specifically identify areas of suitable old growth forest habitat (ROD SG-9). Sources of information include Forest Service GIS coverage (vegetation, riparian, soils layers), Late Successional Reserve (LSR) maps, aerial photos, topographic maps, District botany records and knowledge from past field visits and surveys in the area, communication with other resource specialists familiar with the project area, and scientific literature. Survey protocols and Conservation Assessments and Management Recommendations (which include habitat requirements for vascular plants, lichens, bryophytes, and fungi) are also reviewed.

3. If suitable habitat is present, determine if activities are considered habitat-disturbing. For Survey and Manage species habitat-disturbing is not necessarily the same as ground-disturbing. Habitat-disturbing activities are defined as "…those disturbances likely to have a significant negative effect on the species' habitat, its life cycle, its life cycle, microclimate, or life support requirements" (ROD SG-22).

Conduct Field Surveys: Conduct surveys according to applicable Survey and Manage protocols for Survey and Manage Category A and C species (including "equivalent effort" surveys for Survey and Manage Category B species if old-growth habitat is present). Survey guidelines for Survey and Manage species and R6 Sensitive species may vary, but in general for ground disturbing projects greater than one acre intuitive survey transects may be used to cover all high-probability habitats identified during prefield review of existing information.

Manage Known Sites: If sites are found and if there are known sites present within the proposed project area, manage sites according to applicable Conservation Assessments and Management Recommendations. Modify the project accordingly if necessary to prevent habitat disturbance and to provide for persistence of the species at the site and on the Mt. Hood National Forest.

Criteria Used to Determine Effects

1) Presence of listed botanical species in or around the proposed project areas; 2) Presence of suitable habitat within the project area; 3) Potential for project to impact listed botanical species and/or suitable habitat; and 4) Potential for the project to have cumulative long-term effects on the viability of botanical species listed as R6 Sensitive and Survey and Manage on the Mt. Hood National Forest and throughout their range.

Analysis Area

The analysis area is the project area. The analysis of cumulative effects and the final determination of effects also take into consideration the amount of existing late-successional and old-growth forest habitat present in similar mid-upper sub-alpine elevations throughout the Mt. Hood Meadows Permit Area and surrounding reserve areas including the Stringer Meadows Special Interest Botanic Area, Hood River Meadows complex, upper East Fork Watershed, Mt. Hood Wilderness, upper west portions of the Badger Wilderness, and the upper northeast reaches of the White River Wild and Scenic River area.

The analysis area is defined as the project area because potential for habitat disturbance would be directly and indirectly related to activities proposed under all action alternatives. Only the proposed projects or portions of projects proposed in this EIS that have direct or indirect effects are included below under cumulative effects.

Survey Requirements

Past Field Surveys For R6 Sensitive Botanical Species and Survey and Manage Species

Botanical surveys were conducted during November 2008 in the Twilight Parking Lot area and August through early November 2011 in the Twilight Parking Lot area and Sunrise Maintenance Shop Area. R6 Sensitive and Survey and Manage bryophytes, lichens, and vascular plant species were not detected during pre-disturbance surveys; there are no known sites of R6 Sensitive species or Survey and Manage species in the proposed project area (Tables 1 and 2 in the Botany Specialist Report located in the project record). Survey and Manage Category B fungi are also listed as R6 Sensitive and although the two year survey protocol required for Survey and Manage fungi is not required for R6 Sensitive fungi the same protocol is recommended in order to detect fungal species that emerge inconsistently during spring/summer and/or autumn year to year depending on seasonal conditions (see the following discussion under Surveys Not Completed for R6 Sensitive Fungi and Survey and Manage Fungi).

Surveys focused primarily on the interior portions of late-successional forest in the project area with less intensive survey near the disturbed forest edges of existing roads, ski trails, and parking lots. In the proposed Twilight Parking Lot area, there is a shallow seasonal swale south of the existing Hood River Meadows (HRM) Parking Lot. The swale was dry when surveys were conducted in 2008 and 2011 and wetland indicator species were not present. Field surveys confirmed results of prefield review that no rock outcrops, talus slopes, krummholtz /parkland forests, creeks, seeps, springs, or perennially moist microhabitats are present in the proposed project area.

R6 Sensitive Species

The pre-field review process concluded that the following R6 Sensitive species might be present in the proposed project areas: Vascular plant species - *Calamagrostis breweri, Carex vernacula; Diphasiastrum complanatum(Lycopodium complanatum*); Bryophyte species - *Brachydontium olympicum*(moss), *Bryum calobryoides* (moss), *Chiloscyphus gemmiparus* (liverwort), *Conostomium tetragonum* (moss), *Gymnomitrion concinnatum* (liverwort), *Herbertus aduncas* (liverwort), *Rhytidium rugosum* (moss), *Schistostega pennata* (moss), *Tayloria serrata* (moss),*Tetraphis geniculata* (moss), *Tetraplodon mnioides* (moss), *Trematodon boasii (T. asanoi)* (moss); Lichen species - *Chaenotheca subroscida, Hypogymnia duplicata, Lobaria linita, Nephroma occultum, Pannaria rubiginosa (Fuscopannaria rubiginosa), Peltigera pacifica*; and 1 fungal species, *Bridgeoporus nobilissimus.*

Survey Results: R6 Sensitive botanical species listed above were not found during surveys conducted in 2008 or 2011 and there are no known sites that require management.

Known Sites in the Vicinity: Only one R6 Sensitive vascular plant species, *Calamagrostis breweri*, is known to occur in the analysis area. Two sites of the rare Pacific Northwest endemic subalpine grass have been documented in the vicinity of the proposed Sunrise Maintenance Shop area;

however, the sites are outside the proposed project areas. There are no other known sites of R6 Sensitive botanical species in the proposed project area.

Survey & Manage Category A and C Species (Surveys Practical)

Suitable Habitat Present: Surveys have been completed according to applicable protocols and guidelines for the following two bryophyte species, three lichen species, and one fungi species; these species were not detected during surveys of suitable habitats present in the project area: Category A Bryophytes (No Cat. C) - *Schistostega pennata* (moss), *Tetraphis geniculata* (moss); Category A Lichens (No Cat. C) - *Leptogium burnetiae* var. *hirsutum*, *Leptogium cyanescens, Lobaria linita*; Category A Fungi (No Cat. C) - *Bridgeoporus nobillisimus.*

Habitat Not Present: Perpetually moist forested riparian habitat typically associated with the following Category A and C vascular plant species and lichen species, within range of the Mt. Hood National Forest, is not present in the proposed project area and there are no known sites that require management: Vascular Plants - *Botrychium minganense, Botrychium montanum, Corydalis aquae-gelidae, Coptis trifolia, Cypripedium montanum.* Lichens - *Hypogymnia duplicata, Pseudocyphellaria rainierensis.*

Survey & Manage Category D and E Species (Surveys Not Required)

Late-successional forest habitat is present in the proposed project area for one Category D fungal species, *Phaeocollybia attenuata*, and two Category E lichen species, *Chaenotheca subroscida* and *Tholurna dissimilis*, also listed as R6 Sensitive species. Pre-disturbance surveys are not required for Survey and Manage Category D and E species (2001 ROD SG-11, 12); however, the three species listed above are also R6 Sensitive therefore surveys were completed for lichen species *Chaenotheca subroscida* and *Tholurna dissimilis*, but surveys were not conducted for fungal species *Phaeocollybia attenuata* because surveys were not practical with a two year multi-season survey protocol. *Chaenotheca subroscida* and *Tholurna dissimilis* were not detected during surveys and there are no known sites that require management. Fungal species *Phaeocollybia attenuata* is addressed below, as a R6 Sensitive Species, and also under Effects Analysis.

R6 Sensitive Fungi and Survey and Manage Category B Fungi

R6 Sensitive fungi within range of the Mt. Hood National Forest are the same as those listed under Survey and Manage. Surveys have only been completed for one fungal species, *Bridgeoporus nobilissimus* because the species is identifiable year around.

In the project area, soils near the edges of forested stands in the vicinity of parking lots and access roads are annually covered by "road-sanding" gravel deposited by snow-blowing machinery used to clear roads and parking lots. The annual accumulation of gravel alters the natural development of rich soils that are normally created over time by layers of decomposing branches, leaves, and down woody debris.

For Survey and Manage Category B fungi a two year multi-season survey protocol is required only in projects that might disturb old growth habitat (surveys are not required for projects in other stand types). Marginal late-successional forest habitat for Category B fungal species is present, but old growth forest habitat is not present in the proposed project area.

Forest Service Policy for R6 Sensitive species does not require surveys to be conducted for projects. Surveys are considered a tool to assist in determining the effect of a project upon the

species in question. If a decision is made to conduct surveys for R6 Sensitive fungi, a minimum two year survey protocol is recommended. Surveys in the proposed project area were only conducted during late summer through late autumn 2011 and late autumn 2008. No autumn fruiting fungal species were found. Surveys were not conducted for fungal species that emerge only during spring and early summer.

Multi-year/multi-season surveys are necessary because fungi do not fruit (produce mushrooms) consistently each year. Sporocarp (fruiting body) production is variable and unpredictable from year to year for all fungi (Vogt et al. 1992); therefore, a one-time survey only conducted during spring, summer, or autumn cannot reliably determine the presence or absence of a species. In addition, surveys are less likely to find hypogeous fungi (e.g., below ground fruiting such as truffles and false truffles) because locating the fruiting bodies requires digging or raking to remove soil, duff, and forest debris. While multi-year surveys are more likely to detect epigeous fungi (above ground fruiting), the timing has to be planned based on seasonal weather patterns year-to-year, which does not always correspond with project timelines.

At the time surveys were conducted in 2008, proposed activities in the Sunrise Maintenance Shop area had not been identified. Proposed activities in the Sunrise Maintenance Shop area and the Twilight Parking Lot area were not finalized until late summer 2011. Multi-year surveys were not feasible given the timeline of the proposed project and development of alternatives; therefore, it is assumed that the following fungi R6 Sensitive/Survey and Manage fungi are present because late-successional forest habitat is present: *Alpova alexsmithii, Choiromyces venosus, Chroogomphus loculatus, Cortinarius barlowensis, Cystangium idahoensis, Gastroboletus imbellus, Gomphus kaufmannii, Helvella crassitunicata, Hygrophorus caeruleus, Leucogaster citrinus, Macowanites mollis, Mycena monticola, Octaviania macrospora, Phaeocollybia attenuata, Phaeocollybia californica, Phaeocollybia oregonensis, Phaeocollybia piceae, Phaeocollybia pseudofestiva, Phaeocollybia scatesiae, Ramaria amyloidea, Ramaria aurantiisiccescens, Ramaria gelatiniaurantia, Ramaria spinulosa* var. *diminutive, Rhizopogon ellipsosporus, Rhizopogon exiguous, Rhizopogon inquinatus, Sowerbyella rhenana,* and *Stagnicola perplexa.*

3.8.3 Existing Condition

Habitat Description

The Mt. Hood Meadows Parking Improvements project is discussed in this report relevant to the general location of proposed project activities described under action Alternatives 2-6. The Twilight Parking Lot area includes construction of a guest services building, installation of associated utility lines, clearing of forest to create new Nordic ski trails, relocation of Elk Meadows Trail, a left turn lane from Highway 35, and a bus maintenance area; 2) the Sunrise Maintenance Shop area includes two different locations for the proposed equipment maintenance shop, an associated access road (Alts. 3-5), and installation of associated utility Lines.

The proposed project area is within the Mt. Hood Meadows Permit Area on the southeast slope of Mt. Hood. In general, forested stands in the proposed Twilight Parking Lot area and proposed Sunrise Maintenance Shop area are typical of uneven age late-successional forest that has been fragmented by removal of trees (specifically to create the existing Hood River Meadows, Parking Lot, Sunrise Parking Lot, associated access roads, and Nordic ski trails).

Habitat conditions in and around the proposed Twilight Parking Lot area and Sunrise Maintenance Shop area are typical of harsh mid-high elevation forests on the south-east slopes of Mt. Hood. Forests in the project area are categorized as late-successional; late successional forests are defined as "…forest stands that are a minimum of 80-130 years old, more or less, depending on the site quality, species, rate of stand development, and other factors (ROD SG-77). Based on multiple visits to the project areas and conversations with the District Silviculturist it has been concluded that major components of "old growth" forests (ROD SG-79) are not present in the proposed project area (see the following description under Twilight Parking Lot area and Sunrise Maintenance Shop Area).

The proposed project area is predominantly within a mountain hemlock/big huckleberry and Pacific silver fir/big huckleberry/beargrass plant associations. Vegetation throughout the project area can be best characterized as mid-montane forest dominated by Pacific silver fir (*Abies amabilis*) and mountain hemlock (*Tsuga mertensiana*) in the overstory, with occasional western larch (*Larex occidentalis*) and western white pine (*Pinus monticola*). The understory is dominated by black or mountain huckleberry (*Vaccinium membranaceum*), grouseberry (*Vaccinium scoparium*), oval-leaved huckleberry (*Vaccinium ovalfolium*), false azalea (*Menziesia ferruginea*), and occasionally slender or Oregon wintergreen (*Gaultheria ovatifolia*) in snowmelt depressions. The herb stratum is dominated by beargrass (*Xerophyllum tenax*) and with occasional sedge (*Carex* sp.), Queen's cup (*Clintonia uniflora*), and pearly everlasting (*Anaphilis margaritacea*).

There are no rock outcrops, talus slopes, krummholtz /parkland forests, creeks, seeps, springs, or perennially moist microhabitats in the proposed project area.

The proposed parking lot expansion area ranges from 4100-feet to 4500-feet in elevation on the south east slope of Mt. Hood. The proposed project area is currently fragmented by existing Nordic ski trails and old skid-trails from previous timber sales in the area. Forested patches between (and around) existing Nordic ski trails and old skid-trails are comprised of uneven-aged stands with a variety of age classes represented and less than 4 snags per acre larger than 12 inches DBH; approximately 2 trees per acre are estimated to range between 150-180 years old, and approximately 90 percent of the remaining trees are estimated to be 150 years old or less[5] .

The proposed vehicle maintenance shop project locations near the Sunrise Maintenance Shop area range from 4300-feet to 4600-feet in elevation. The surrounding forested area is comprised predominantly of uneven-aged trees and less than 2 snags per acre larger than 12 inches diameter at breast height (DBH); a variety of age classes is represented with the overall average stand age is between 131 to 150 years old.

Late-successional Subalpine Forest Habitat

Mixed aged forested stands in the project area meet the definition of late-successional forest (ROD SG-77). On Mt. Hood, mid-high elevation late-successional forest habitats are limited to a narrow elevation band around the mountain (generally between 3500 feet to 6000 feet depending on slope and aspect). Mountain hemlock and Pacific silver-fir trees in forests in the mid-upper elevations on the south and east slopes of Mt. Hood are generally slow growing in

5- Personal communication with MHNF Eastside Silvicurist Whitney Olskar, March 2012.

harsh volcanic soils and are susceptible to seasonal flooding and landslides from snowmelt, and droughts and associated stresses such as insect damage and fire; these natural stresses and ecological disturbances create natural openings in the forest suitable for early successional herbaceous species to thrive (beargrass, lupine, sedges, etc.) but not for species associated with late-successional and old-growth forests.

In the project area late-successional forest stands are bordered by non-forested openings created intentionally to be maintained as parking lots, structure foundations, roadways, Nordic ski trails (approximately 25 to 40 feet wide, with forested islands approximately 80-150 feet wide between ski trails). Forested habitats surrounding areas maintained as openings are susceptible to edge effects (drying conditions due to loss of thermal cover and increased light). Edge effects can extend up to 100 feet or more from the edges of clearings into the interior of surrounding forests, which makes habitat near edges of forested openings less suitable for many late-successional and old growth forest associated species (Chen and Franklin 1992).

Past Disturbances Contributing to Existing Conditions

Natural environmental disturbances, primarily floods and fires, have occurred historically in and around the proposed project area. Ground-disturbing projects listed below have been implemented over the years in the immediate vicinity of the proposed project areas. Natural environmental processes and past project related disturbances in and around the analysis area have all caused fragmentation of habitat and connectivity for dispersal of botanical species associated with mid-upper elevation late-successional and old-growth forests.

In the Twilight Parking Lot area, the proposed project is bordered on north side by the Hood River Meadows Parking Lot constructed in 1995. Mixed age forest habitat was logged and approximately 3 acres of the cleared area was converted to impervious pavement. The west side of the proposed project area is bordered by approximately 2 miles of paved road to access the Hood River Meadows (HRM) Parking lot.

During winter months, gravel is spread on the HRM Parking Lot and access road for traction, and the lot and road are cleared of snow by plows and snow-blowing machinery. There is physical evidence that annual snow-blowing of the parking lot and access road has deposited layers of fine gravel up to 150 feet out from the edges of the parking lot and road. Plant communities and humus soil are least developed near the forested edges in these areas because of the annual accumulation of gravel.

The south side of the proposed Twilight Parking Lot area is bordered by a one acre non-forested clearing used by the Oregon Department of Transportation (ODOT) as a storage facility for gravel and ODOT equipment. Highway 35 is approximately one mile from the southeast side of the proposed Twilight Parking Lot area.

Within the proposed Twilight Parking Lot area, approximately three acres (or approximately 3,400 feet) of Nordic ski trails were logged in the early 1990s. The ski trails are annually maintained as non-forested openings to a clearance width of approximately 35 to 40 feet and sinuously loop between forested patches that are approximately 80 to 150 feet wide (see project maps and descriptions for Alternatives 2-6 in EIS).

In the Sunrise Maintenance Shop area proposed sites for a vehicle maintenance shop in the vicinity of the existing parking lot (or adjacent to the administrative building) are also located in an area that has been surrounded by multiple ground-disturbing project activities over the years.

The Sunrise Parking Lot (also locally known as Mt. Hood Meadows Annex Parking Lot) was built in the late 1990s. Mixed aged subalpine forest habitat was logged and the cleared area was surfaced with gravel. There is a mixed age forested island approximately 300 feet wide between Sunrise parking lot, Forest Service Road (FSR) 3545, and the existing administrative building. Annual snow-blowing along access FSR 3545 has deposited layers of sand and gravel up to 150 feet through the forest from the edge of the road; plant species diversity is lowest in the forested edges covered by deposited materials and plant communities there remain in the early seral stage of development.

Alternative 2 proposes a vehicle maintenance shop north of the Sunrise Parking Lot in an area that encompasses a cleared ski trail (approximately 40 feet wide and ½ mile long) constructed during the 1990s. The ski trail is presently maintained as an un-forested opening that connects the Sunrise Parking Lot with the existing administrative building to the north.

Specific-Species Existing Conditions

The following information condensed from known site data generally describes the potential affected environment for each of the fungi species listed above. The specific potential effects on these species (if they are present) and on their suitable habitat, as a result of proposed project activities, are discussed in detail under Effects Analysis.

- *Alpova alexsmithii* is in the false truffle group, forms fruiting bodies beneath the soil surface and is associated with conifer trees in the Pinaceae family, particularly western hemlock and mountain hemlock, from 1,200 to 3,200 meters in elevation. There are only four known sites on the Mt. Hood National Forest (NRIS 2010).

- *Choiromyces venosus* is in the true truffle group, forms fruiting bodies beneath the soil surface under Douglas-fir and western hemlock at low elevations. Only two known sites were reported for this species in the Northwest Forest Plan area in 1999 (Castellano et al.). No known sites are documented on the Mt. Hood National Forest (NRIS 2010), but the species is suspected to occur on the Forest.

- *Chroogomphus loculatus* is endemic to Oregon and forms fruiting bodies beneath the soil surface. This species is associated with various conifers in the Pinaceae family, particularly mountain hemlock, at mid-elevations. No known sites are documented on the Mt. Hood National Forest (NRIS 2010), but the species is suspected to occur on the Forest.

- *Cortinarius barlowensis* is widely distributed, known from 16 sites in the western Cascade Range (Oregon and Washington), Coast Range, and Olympic Mountains. There are two known sites from the Mt. Hood National Forest (Zigzag Ranger District). Habitat is soil in coniferous forest.

- *Cystangium idahoensis* (formerly Martellia idahoensis) forms fruiting bodies beneath the soil surface and is associated with the roots of Pacific silver fir, subalpine fir, noble fir,

Engelmann spruce, and mountain hemlock from 1,200 to 1,650 meters in elevation. No known sites are documented on the Mt. Hood National Forest (NRIS 2010), but the species is suspected to occur on the Forest.

- *Gastroboletus imbellus* is endemic to Oregon and only one site has been reported for this species (currently only on the Willamette National Forest). No known sites are documented on the Mt. Hood National Forest (NRIS 2010), but the species is suspected to occur on the Forest. This species forms fruiting bodies beneath the soil surface and is associated with the roots of grand fir, subalpine fir, and mountain hemlock at higher (5,000 ft. or more) elevations.

- *Gomphus kauffmanii* is endemic to western North America and found in California, Oregon, and Washington along the Pacific coast or in the Cascade Range. There are six known sites for this mushroom on the Mt. Hood National Forest. Host trees for G. kauffmanii include true firs and pines. G. kauffmanii forms symbiotic associations with the fine-root systems of plants.

- *Helvella crassitunicata* is endemic to Oregon and Washington and grows scattered to gregarious on soil, especially along trails, in montane regions with Pacific silver fir, noble fir, grand fir, and subalpine fir. There are only two known sites documented on the Mt. Hood National Forest (NRIS 2010).

- *Hygrophorus caeruleus* is endemic to Oregon and Washington and occurs in soil with roots of conifer trees near melting snowbanks. The species epithet caeruleus refers to the blue-tinged color of the mushroom and its blue-green waxy gills. No known sites are documented on the Mt. Hood National Forest (NRIS 2010), but the species is suspected to occur on the Forest.

- *Leucogaster citrinus*, a false truffle, is endemic to the Pacific Northwest with 45 sites known from western Washington, western Oregon, and northern California. There are four known sites on the Mt. Hood National Forest (Zigzag Ranger District). This below-ground-fruiting species is associated with the roots of white fir, subalpine fir, lodgepole pine, western white pine, Douglas- fir, and western hemlock from 280 to 2,000 meters in elevation.

- *Macowanites mollis* is endemic to Oregon and Washington. There is only one known site on the Mt. Hood National Forest (Larch Mountain). This mushroom looks like a disfigured specimen of *Russula* or *Lactarius* and is found in association with the roots of grand fir, Douglas-fir, and western hemlock above 1,000 meters elevation.

- *Mycena monticola* is endemic to the Pacific Northwest scattered across the western and eastern Cascade Range, the Klamath Mountains, and the Olympic Mountains. On the Mt. Hood National Forest, the species has been documented in the Bear Springs Campground, Barlow Ranger District. *Mycena monticola* is restricted to conifer forests above 1,000 meters in elevation, particularly those with *Pinus* species and is usually found in gregarious, caespitose clusters in duff.

- *Mythicomyces corneipes* is widespread across western North America and northern Europe and was reported on the Mt. Hood National Forest (Castellano et al. 2003); however, no known sites are documented on the Mt. Hood National Forest in the NRIS database (2010). This species is in the *Cortinariaceae* family, is solitary to gregarious in habit, and grows along margins of bogs among mosses or on wet soil under conifers and alder species.

- *Octaviania macrospora*, a false truffle, is endemic to Oregon and found in association with the roots of western hemlock. One known site for the entire Northwest Forest Plan area is reported for the Mt. Hood National Forest (Twin Bridges Campground) by Castellano et al. (1999); however, no known sites are documented on the Mt. Hood National Forest in NRIS (2010).

- *Phaeocollybia attenuata* is endemic to western North America from British Columbia south to Marin County (northern California) with 131 sites known from western Washington and Oregon to northern California. One known site is reported by Castellano et al. (1999) for the Mt. Hood National Forest (Larch Mountain); however, no known sites are documented in NRIS (2010). P. *attenuata* grows scattered to closely gregarious in humus and with mosses in moist coniferous forest (Sitka spruce, western hemlock, true firs, and Douglas-fir). It is recorded most frequently from Oregon coastal forests (Norvell & Exeter 2009).

- *Phaeocollybia californica* is endemic to the Pacific Northwest with 34 sites known from western Washington, western Oregon, and northern California. There is one known site on the Mt. Hood National Forest (Larch Mountain) recorded in NRIS (2010). *P. californica* is terrestrial (mycorrhizal), fasciculate (growing in close bundles) to gregarious (growing in arcs) in habit, and occurs in humus soils of moist coniferous (true fir, hemlock, Douglas-fir) forest and mixed (true fir, Pacific marine, oak, Douglas-fir, and hemlock) coastal and coastal montane forests.

- *Phaeocollybia oregonensis* is endemic to the Pacific Northwest with 10 sites known from the Oregon Coast Range and the western Cascade Range. There are five known sites documented on the Mt. Hood National Forest (NRIS 2010). This mushroom species is terrestrial (mycorrhizal), occurring solitary to gregarious, and associated with the roots of true fir, western hemlock, and Douglas-fir.

- *Phaeocollybia piceae* is endemic to the Pacific Northwest, known from 49 sites in western Washington, western Oregon, and northern California. One known site is reported by Castellano et al. (1999) for the Mt. Hood National Forest (Wildcat Mountain); however, no known sites are documented in NRIS (2010). This mushroom species is terrestrial (mycorrhizal), occurring solitary to scattered in small groups, and associated with coniferous (spruce, hemlock, Douglas- fir, true fir) forests.

- *Phaeocollybia pseudofestiva* is endemic to the Pacific Northwest, known from British Columbia south through western Washington and western Oregon to California. There are 38 known sites in Washington, Oregon, and California. Only two sites are documented on the Mt. Hood National Forest (NRIS 2010). The species is terrestrial (mycorrhizal) and

occurs solitary to densely gregarious in coniferous (spruce, fir, hemlock, and Douglas-fir) forest.

- *Phaeocollybia scatesiae* is endemic to the Pacific Northwest with 17 sites documented in the Northwest Forest Plan area, three of those on the Mt. Hood National Forest (Zig-zag Ranger District). This species is terrestrial (mycorrhizal), grows densely caespitose (clumped) in erumpent mounds in woody humus in coastal and montane (<4,000 ft.) coniferous forests.

- *Ramaria amyloidea* is endemic to the Pacific Northwest with 16 sites known from western Washington to northern California. There is one known site on the Mt. Hood National Forest (NRIS 2010). Habitat for the species is soil in coniferous forest.

- *Ramaria gelatiniaurantia* is endemic to the Pacific Northwest with 24 sites known from western Washington to northern California. Three sites are reported by Castellano et al. (1999) for the Mt. Hood National Forest (Eagle Creek, junction of Forest Service Roads 4610 and 150, and Fish Creek Road); however, no known sites are documented in NRIS (2010). Habitat for the species is humus or soil in coniferous (true fir, Douglas-fir, and western hemlock) forest.

- *Ramaria spinulosa var. diminutiva* has not been reported for the Mt. Hood National Forest, but it is suspected to occur here. Castellano et al. (1999) reported a site in Mendocino County (northern California) and a site on the Mt. Baker-Snoqualmie National Forest (Glacier Peak Wilderness). Habitat for the species is humus or soil in coniferous (true fir, Douglas-fir, and western hemlock) forest.

- *Rhizopogon exiguus*, a false truffle, is endemic to Oregon with known sites from the Mt. Baker-Snoqualmie, Siuslaw, and Siskiyou National Forests. There are no known sites on the Mt. Hood National Forest although the species is suspected to occur here. This species is associated with the roots of Douglas-fir and western hemlock.

- *Rhizopogon inquinatus*, a false truffle, is found in association with the roots of Douglas-fir and western hemlock from 500 to 1,400 meters elevation. There are no known sites on the Mt. Hood National Forest although the species is suspected to occur on the Forest. Castellano et al. (1999) report two sites on the Willamette National Forest.

- *Sowerbyella rhenana* occurs in Europe, Japan, and northwest North America. In the Pacific Northwest, it is known from 63 sites in western Washington, western Oregon, and northern California, including two sites from the Mt. Hood National Forest (Eagle Creek, Rhododendron) according to Castellano et al. (1999); however, only one known site is listed in NRIS (2010) for the Forest. This species grows scattered to gregarious to caespitose (clumped) in duff of moist, relatively undisturbed, older coniferous forests (Castellano et al. 1999).

- *Stagnicola perplexa*, in the Cortinariaceae family, grows in groups on rotten wood, occasionally buried deeply enough to appear rooting in wet (or recently) dried-up depressions in coniferous forest. One known site is reported for the Mt. Hood National Forest (middle

fork of the Salmon River) by Castellano et al. (2003); however no known sites are listed in NRIS (2010) for the Forest.

3.8.4 Effects Analysis/Environmental Consequences

Alternative 1 – No Action

Under the No Action alternative habitat disturbing activities described under Alternatives 2-6 would not occur. Trees would not be cut to convert forested areas to long-term unforested openings. Host trees needed for survival of some fungi species would remain and soil disturbance (including compaction and potential subsequent short-term erosion caused by machinery) would not occur. The exchange of nutrients between host trees and fungi would not be affected by habitat-disturbing activities proposed under action Alternatives 2-6.

Existing roads, parking lots, and ski trails would continue to be maintained as non-forested openings in the analysis area and snow blowing machinery would continue to spray seasonal traction gravel up to 150 feet from the edges of roads and parking lots into forested habitat, but the interior late-successional forest habitat would continue to mature in response to natural influences. If R6 Sensitive Species and Survey and Manage fungi species are present in the vicinity of the analysis area, they might provide a reproductive source to disperse into suitable forested habitat as it matures under the No Action alternative.

Effects Common to Alternatives 2-6

There are no known sites of R6 Sensitive or Survey and Manage Category A, C, E, and D species in the proposed project area, and action alternatives would have no effect on the species (see Tables 1 and 2 in the Botany Specialist Report located in the project record); they are not discussed further in this analysis of effects.

There is suitable late-successional forest habitat for R6 Sensitive fungi and Category B fungi that would be impacted by proposed project activities, if species are present. Because surveys were not completed according to multi-season protocol to detect fungi, the determination of effects is made based on the assumption that fungal species might be present because suitable habitat is present.

Activities proposed under Alternatives 2-6 would essentially have the same potential direct, indirect, and cumulative effects on mid-elevation late-successional forest habitat. The only notable difference between alternatives is the acreage of forested habitat that would be converted to non-forested land. Individual actions proposed under each alternative may vary but direct, indirect and cumulative effects on mid-late successional forest habitat for fungi would essentially be the same.

Direct Effects

Alternatives 2-6 would remove between 9.4 acres and 22 acres of forested habitat to create openings that would be maintained as parking lots, access roads, buildings, and trails. Tree removal and the process of tree removal in the project area is the primary action that would directly affect the mycorrhizal connection of fungi that require host trees for survival. Mycological research indicates that mycelia of mycorrhizal fungi can form an extensive

underground web (a wood-wide web) linking them to the fine roots of trees; "host" trees are needed for survival of some fungi species (Beiler et al. 2009, Zhou et al. 2001, Simard & Durall 2004).

Indirect Effects

Under Alternatives 2-6, trees that remain standing near the edges of newly created openings, but were previously sheltered among interior forest, would be more vulnerable to blowing down in strong winds. Forested habitats surrounding areas maintained as un-forested openings would become susceptible to edge effects (drying conditions due to loss of thermal cover and increased light). Late-successional forest stands bordered by non-forested openings, like those in the project areas (i.e., parking lots, roads, 40-foot wide ski trails, and clearings for buildings), are susceptible to edge effects (drying conditions due to loss of thermal cover and increased light). Edge effects can extend up to 100 feet or more from the edges of clearings into the interior of surrounding forests, which makes habitat near edges of forested openings less suitable for many late-successional and old growth forest associated species (Chen and Franklin 1992).

Under Alternatives 2-6 the removal of snow would be needed to clear the proposed parking lot and access roads. There is evidence that during the process of clearing snow (i.e., snow-blowing) gravel can be sprayed out into the surrounding forests up to 150-feet from the edges of a clearing. Annual accumulations of gravel deposited into the interior of remaining forested habitat alter the natural accumulation of forest debris needed for the development of mineral soil over time, and the hence slow the spread of mycelia needed for fungal nutrient exchange (Allen, 1991). Well-developed soils (especially in older forests) are beneficial for the formation of mycorrhizal networks and the exchange of nutrients between fungi and associated host trees (Vogt et al. 1992).

Cumulative Effects

The spatial context for the following effects analysis is the affected environment described under Existing Conditions. The discussion of cumulative effects (and the final determination of effects) also considers the presence of suitable habitat in reserves outside the project area because the areas encompass pristine subalpine late-successional forest habitat needed for persistence of associated botanical species within range of the Mt. Hood National Forest.

The temporal context for the following effects analysis depends on existing and future project related activity – if there is an overlap in time from an effects perspective then it is included in the discussion under cumulative effects.

Past disturbances in the project area have added to cumulative loss of mid-upper elevation late-successional forest. Any current and future actions that convert forested habitat to non-forested habitat also contribute to the cumulative fragmentation of mid-upper elevation late-successional forest habitat in the analysis area and on Mt. Hood. Forests that are fragmented by large un-forested openings lack habitat connectivity needed for dispersal of late-successional and old-growth associated species that require specific mid-upper elevation forested habitats.

Although the loss of forested acres under Alternatives 2-6 would further impact habitat connectivity for fungal species, if they are present in the analysis area, they are most likely present in existing undisturbed forests surrounding the immediate area (and throughout the Mt. Hood Meadows Permit Area) and also in similar elevation late-successional and old-growth forests in reserve areas around the upper slopes of Mt. Hood (Stringer Meadows Special Interest Botanic

Area, upper East Fork Watershed, Mt. Hood Wilderness, upper west portions of the Badger Wilderness, and the upper northeast reaches of the White River Wild and Scenic River area). In addition, essential habitat is expected to remain protected in late-successional and old-growth forest reserve areas throughout the range of the Northwest Forest Plan where application of Survey and Manage Standards and Guidelines is intended to provide for persistence of Survey and Manage botanical species (including those also listed as R6 Sensitive).

Summary of Effects by Alternative

No Action (Alternative 1)
Under the No Action Alternative, stands would continue to progress through natural successional stages that are already occurring. Forested habitat would not be converted to non-forested openings and impervious surfaces. Existing forested habitat for fungi would continue to evolve in response to natural processes in general and local environmental conditions occurring in the area over time.

Proposed Action (Alternative 2)
Under the Proposed Action approximately 16 acres of late-successional forested habitat would be removed and converted to non-forested land. Loss of forested habitat May Impact R6 Sensitive Fungi and Survey and Manage Fungi individuals (if they are present) and their late-successional forest habitat but is not expected to lead to a loss of viability or trend toward Federal listing.

New Nordic Trails (Alternative 3)
Approximately 22 acres of late-successional forested habitat would be removed and converted to non-forested land. Loss of forested habitat May Impact R6 Sensitive Fungi and Survey and Manage Fungi individuals (if they are present) and their late-successional forest habitat but is not expected to lead to a loss of viability or trend toward Federal listing.

Elk Meadow Master Plan (Alternative 4)
Approximately 9.4 acres of late-successional forested habitat would be removed and converted to non-forested land. Loss of forested habitat May Impact R6 Sensitive Fungi and Survey and Manage Fungi individuals (if they are present) and their late-successional forest habitat but is not expected to lead to a loss of viability or trend toward Federal listing.

Elk Meadow (Alternative 5)
Approximately 17 acres of late-successional forested habitat would be removed and converted to non-forested land. Loss of forested habitat May Impact R6 Sensitive Fungi and Survey and Manage Fungi individuals (if they are present) and their late-successional forest habitat but is not expected to lead to a loss of viability or trend toward Federal listing.

Preferred Alternative (Alternative 6)
Approximately 10.7 acres of late-successional forested habitat would be removed and converted to non-forested land. Loss of forested habitat May Impact R6 Sensitive Fungi and Survey and Manage Fungi individuals (if they are present) and their late-successional forest habitat but is not expected to lead to a loss of viability or trend toward Federal listing.

3.8.5 Consistency Determination

Activities proposed under Alternatives 2-6 are in compliance with the following Forest Service policy, direction, standards and guidelines because: 1) Surveys have been completed in all suitable

habitats for R6 Sensitive bryophytes, lichens, and vascular plant species and have been conducted according to protocols for Survey and Manage Category A and C species; 2) There are no known sites that require management; 3) Proposed project activities would not impact known sites of R6 Sensitive vascular plant *Calamagrostis breweri* because the sites are outside of the proposed project activity area; and, 4) The proposed project as described under Alternatives 2-6 would not lead to a loss of viability or trend toward Federal listing of undetected R6 Sensitive fungi species and Survey and Manage fungi species on the Mt. Hood National Forest or throughout their range for reasons listed above under Summary of Effects – Rationale for Effects Determination.

Forest Service Policy - Viability

2672.1 Sensitive Species Management: "Sensitive species of native plant and animal species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in the need for Federal listing. There must be no impacts to sensitive species without an analysis of the significance of adverse effects on the populations, its habitat, and on the viability of the species as a whole. It is essential to establish population viability objectives when making decisions that would significantly reduce sensitive species numbers."

FSM 2670.22(2): "Maintain viable populations of all native and desired non-native wildlife, fish and plant species in habitats distributed throughout their geographic range on National Forest System lands."

FSM 2670.3: Forest Service policy requires a 5-step biological evaluation process to "assure that management activities do not jeopardize the continued existence of sensitive species or result in an adverse modification of their essential habitat".

Mt. Hood National Forest Plan Direction

FW-148 and 149: Management activities shall preserve and enhance the diversity of plant and animal communities, including endemic and desirable naturalized plant and animal species. The diversity of plants and animals shall be at least as that which would be expected in a natural forest; the diversity of tree species shall be similar to that existing naturally in the allotment area (36 CFR 219.27) FW-150.

FW-162: Habitat management should provide for the maintenance of viable populations of existing native and desired non-native wildlife, fish (36 CFR 219.19) and plant species (USDA Regulation 9500-4) well distributed throughout their current geographic range within the National Forest System.

FW-175: Habitat for threatened, endangered, and sensitive plants and animals shall be protected and/or improved.

Mt. Hood Meadows Master Plan 1997 ROD & Forest Plan Amendment (No. 10)

ROD A-7.6: Impacts to R6 Sensitive Plant populations and habitats will be avoided by project design and machine activity.

Northwest Forest Plan 2001 Record of Decision Standards and Guidelines

Standard & Guideline (SG) 6-11, and SG 41-50: Conduct pre-disturbance surveys for species in Rare & Uncommon Categories A and C.
SG 23-24: Conduct surveys according to protocol.

3.8.6 Summary of Effects

The only significant difference between alternatives is acreage. Individual actions proposed under each alternative may vary but direct, indirect, and cumulative effects on late-successional forest habitat for fungi would essentially be the same.

Alternatives 2-6 May Impact fungi individuals (if they are present) and their late-successional forest habitat but would not lead to a loss of viability or trend toward Federal listing of the following species: *Alpova alexsmithii, Choiromyces venosus, Chroogomphus loculatus, Cortinarius barlowensis, Cystangium idahoensis, Gastroboletus imbellus, Gomphus kaufmannii, Helvella crassitunicata, Hygrophorus caeruleus, Leucogaster citrinus, Macowanites mollis, Mycena monticola, Octaviania macrospora, Phaeocollybia attenuata, Phaeocollybia californica, Phaeocollybia oregonensis, Phaeocollybia piceae, Phaeocollybia pseudofestiva, Phaeocollybia scatesiae, Ramaria amyloidea, Ramaria aurantiisiccescens, Ramaria gelatiniaurantia, Ramaria spinulosa* var. *diminutive, Rhizopogon ellipsosporus, Rhizopogon exiguous, Rhizopogon inquinatus, Sowerbyella rhenana, Stagnicola perplexa.*

Survey and Manage is a mitigation measure designed to provide a reasonable assurance of species persistence within the Northwest Forest Plan area. Activities proposed under Alternatives 2-6 are not expected to affect persistence or viability of Survey and Manage fungal species R6 Sensitive fungi on the Mt. Hood National Forest or throughout their range because essential habitat is expected to remain protected in similar mid-upper elevation late-successional/old-growth forest reserve areas around Mt. Hood, the Mt. Hood National Forest, and throughout the range of the Northwest Forest Plan where application of Survey and Manage Standards and Guidelines are intended to provide for persistence of Survey and Manage botanical species.

There are no known sites of R6 Sensitive Bryophytes, Lichens, and Vascular Plants in the proposed project area. Alternatives 2-6 would have No Impact on R6 Sensitive Bryophytes, Lichens, and Vascular Plants.

3.8.7 Incomplete and Unavailable Information

All information needed to perform this analysis is complete and available.

3.9 Noxious Weed

More information is available in the project record including the full noxious weed analysis file, as part of the Noxious Weed Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.9.1 Introduction

Invasive plants are any plant species not native to a particular ecosystem and are likely to cause environmental harm or harm to human health. They include, but are not limited to, species on the Oregon Department of Agriculture (ODA) Noxious Weed list. Invasive plants may disrupt natural ecosystems by displacing native species and reducing natural diversity through the replacement of native communities with invasive monotypic weed stands. Invasive plants and noxious weeds

reduce productivity of forest ecosystems by outcompeting and displacing desirable native species and monopolizing valuable resources (Oregon Weed Control Program 2002). Please refer to the tables below that list both ODA Noxious Weeds (Table 3-66) and the Supplemental List of Invasive Plants for the Hood River Ranger District (Table 3-67).

In addition to the species on the following lists, it should be noted that new invasive plant species are continually being introduced and are spreading to new areas. These new invaders may not yet be included on the current lists.

Table 3-66: ODA Noxious Weed List

Rating	Common Name	Scientific Name
B	velvetleaf	*Abutilon theophrasti*
B	bidy-bidy	*Acaena novae-zelandiae*
B	Russian knapweed	*Acroptilon repens*
B	jointed goatgrass	*Aegiops cylindrica*
A	ovate goatgrass	*Aegilops ovata*
A	barbed goatgrass	*Aegilops triuncialis*
B	quackgrass	*Agropyron repens*
A	camelthorn	*Alhagi pseudalhagi*
B	ragweed	*Ambrosia artemisiifolia*
A	skeletonleaf bursage	*Ambrosia tomentosa*
B	common bugloss	*Anchusa officinalis*
B	false brome	*Brachypodium sylvaticum*
B	lens podded white top	*Cardaria chalapensis*
B	white top (hoary cress)	*Cardaria draba*
B	hairy white top	*Cardaria pubescens*
B	musk thistle	*Carduus nutans*
A	plumeless thistle	*Carduus alanthoides*
B	Italian thistle	*Carduus phycnocephalus*
B	slender flowered thistle	*Carduus tenuiflorus*
A	smooth distaff thistle	*Carthamus baeticus*
A,T	wooly distaff thistle	*Carthamus lanatus*
A,T	purple starthistle	*Centaurea calcitrapa*
B	diffuse knapweed	*Centaurea diffusa*
A,T	Iberian starthistle	*Centaurea iberica*
B,T	spotted knapweed	*Centaurea stoebe (C. maculosa)*
B	short fringed knapweed	*Centaurea nigrescens*
B	meadow knapweed	*Centaurea pratensis*
B,T	yellow starthistle	*Centaurea solstitialis*
A,T	squarrose knapweed	*Centaurea virgata*
B,T	rush skeletonweed	*Chondrilla juncea*
A	western water hemlock	*Cicuta douglasii*
B	Canada thistle	*Circium arvense*

Table 3-66: ODA Noxious Weed List (Continued)

Rating	Common Name	Scientific Name
B	bull thistle	*Circium vulgare*
B	traveler's joy	*Clematis vitalba*
B	poison hemlock	*Conium maculatum*
B	field bindweed	*Convolvulus arvensis*
B	common crupina	*Crupina vulgaris*
B	houndstongue	*Cynoglossum officinale*
B	yellow nutsedge	*Cyperus esulentus*
A	purple nutsedge	*Cyperus rotundus*
B	French broom	*Cytisus monspessulanas*
B	Scotch broom	*Cytisus scoparius*
B	Portugese broom	*Cytisus striatus*
B	cutleaf teasel	*Dipsacus laciniatus*
B	South American waterweed (elodea)	*Elodea (=Egeria) densa*
B	giant horsetail	*Equisetum telmateia*
B,T	leafy spurge	*Euphorbia esula*
B	Japanese knotweed	*Fallopia japonica*
B	Himalayan knotweed	*Fallopia polystachyum*
B	giant knotweed	*Fallopia sachalinensis*
B	shiny leaf geranium	*Geranium lucidum*
B	herb Robert	*Geranium robertianum*
B	halogeton	*Halogeton glomeratus*
B	English ivy	*Hedera helix*
A	Texas blueweed	*Helianthus ciliaris*
B	spikeweed	*Hemizonia pungens*
A,T	giant hogweed	*Heracleum mantegazzianum*
A	orange hawkweed	*Hieracium aurantiacum*
A,T	yellow hawkweed	*Hieracium floribundum*
A	mouse ear hawkweed	*Hieracium pilosella*
A	king devil hawkweed	*Hieracium piloselloides*
A	meadow hawkweed	*Hieracium pratense*
A	hydrilla	*Hydrilla verticillata*
B	St. John's-wort (Klamath weed)	*Hypericum perforatum*
B	policeman's helmet	*Impatiens glandulifera*
B	yellow flag iris	*Iris pseudacorus*
B	dyers woad	*Isatis tinctoria*
B	kochia	*Kochia scoparia*
B	perennial pepperweed	*Lepidium latifolium*
B	dalmatian toadflax	*Linaria dalmatica*
B	yellow toadflax	*Linaria vulgaris*
B,T	purple loosestrife	*Lythrum salicaria*

Table 3-66: ODA Noxious Weed List (Continued)

Rating	Common Name	Scientific Name
B	Eurasian watermilfoil	*Myriophyllum spicatum*
A	matgrass	*Nardus stricta*
B	Scotch thistle	*Onopordum acanthium*
B	small broomrape	*Orobanche minor*
B	wild proso millet	*Panicum miliaceum*
A	African rue	*Peganum harmala*
B	sulfur cinquefoil	*Potentilla recta*
A,T	kudzu	*Pueraria lobata*
B	creeping yellow cress	*Rorippa sylvestris*
B	Armenian (Himalayan) blackberry	*Rubus armeniacus*
B	Mediterranean sage	*Salvia aethiopis*
B,T	tansy ragwort	*Senecio jacobaea*
B	milk thistle	*Silyburn marianum*
A	silverleaf nightshade	*Solanum elaegnifolium*
B	buffaloburr	*Solanum rostratum*
B	Johnsongrass	*Sorghum halepense*
A	smooth cordgrass	*Spartina alterniflora*
A	spartina	*Spartina anglica*
A	spartina	*Spartina densiflora*
B	spartina	*Spartina patens*
B	Spanish broom	*Spartium junceum*
B	Austrian peaweed	*Sphaerophysa salsula*
B	dodder	*Suscuta spp.*
B	medusahead rye	*Taeniatherum canput-medusae*
B	tamarix	*Tamarix ramossissima*
B	puncturevine	*Tribulus terrestris*
A	coltsfoot	*Tussilago farara*
B,T	gorse	*Ulex europaeus*
B	spiny cocklebur	*Xanthium spinosum*
A	Syrian bean caper	*Zygophyllum fabago*

Noxious weeds, for the purpose of this rating system, are designated A, B, and/or T according to the Oregon Department of Agriculture:

- "A" Designated weed – A weed of known economic importance that occurs in the state in small enough infestations to make eradication /containment possible; or is not known to occur, but its presence in neighboring states make future occurrence in Oregon seem imminent. Recommended action: Infestations are subject to intensive control when and where found.

- "B" designated weed – A weed of economic importance that is regionally abundant but may have limited distribution in some counties. Where implementation of a fully integrated statewide management plan is infeasible, biological control shall be the main control approach.

- "T" designated weed – A priority noxious weed designated by the State Weed Board as a target weed species for which ODA will implement a statewide management plan.

Table 3-67: Supplemental List of Invasive Plants for the Hood River Ranger District

Common Name	Scientific Name
Norway maple	*Acer platanoides*
tree-of-heaven	*Ailanthus altissima*
European beachgrass	*Ammophila arenaria*
false brome	*Brachypodium sylvaticum*
fountain butterfly bush	*Buddleia alternifolia*
butterfly bush	*Buddleia davidii*
cotoneaster	*Cotoneaster spp.*
pampas grass	*Cortaderia jubata*
pampas grass	*Cortaderia selloana*
English hawthorn	*Crataegus monogyna*
spurge laurel	*Daphne laureola*
foxglove	*Digitalis purpurea*
water hyacinth	*Eichhornia crassipes*
broom	*Genista monspessulana*
shining crane's-bill	*Geranium lucidum*
herb Robert	*Geranium robertianum*
English holly	*Ilex aquifolium*
policeman's helmet	*Impatiens glandulifera*
yellow flag iris	*Iris pseudacorus*
eastern redcedar	*Juniperus virginiana*
perennial peavine	*Lathyrus latifolius*
privet	*Ligustrum spp.*
birdsfoot trefoil	*Lotus corniculatus*
lemon balm	*Melissa officinalis*
common forget-me-not	*Myosotis scorpioides*
water lily	*Nymphaea polysepela*
fountain grass	*Pennisetum spp.*
reed canarygrass	*Phalaris aquatica*
reed canarygrass	*Phalaris arundinacea*
English laurel	*Prunus laurocerasus*
Portugal laurel	*Prunus lusitanica*
sweet cherry	*Prunus avium*
thundercloud cherry	*Prunus cerasifera*

Table 3-67: Supplemental List of Invasive Plants for the Hood River Ranger District (Continued)

Common Name	Scientific Name
firethorn	*Pyracantha spp.*
creeping buttercup	*Ranunculus repens*
black locust	*Robinia pseudoacacia*
sweet-briar	*Rosa eglanteria*
multiflowered rose	*Rosa multiflora*
European mountain ash	*Sorbus aucuparia*
bigleaf periwinkle; vinca	*Vinca major*
common periwinkle;vinca	*Vinca minor*

3.9.2 Analysis Assumptions and Methodology

Analysis Assumptions

1) It is assumed that the final project footprints would be the same as the proposed areas of disturbance described in Chapter 2 of the DEIS. For example, acres of proposed disturbance (regardless of alternative) include all clearings, grading, etc. and are accurate representations of actual disturbance. 2) U.S. Forest Service has only a slight influence on movement of humans, livestock, wildlife, or vehicles in or out of the planning area. Once a small infestation is detected, the rate of spread can be controlled. Mitigation and an active treatment program can control the rate of spread. Herbicides are the most cost effective method for controlling the spread of noxious weeds.

Noxious Weed Risk Assessment Process

The proposed projects have a Moderate Risk of introducing or spreading noxious weeds. Noxious weed control measures are identified under the project design criteria/mitigation measures section of this document. The methodology for risk ranking is detailed below.

Forest Service Manual (FSM) direction requires that Noxious Weed Risk Assessments be prepared for all projects involving ground-disturbing activities. For projects that have a moderate to high risk of introducing or spreading noxious weeds, Forest Service policy requires that decision documents must identify noxious weed control measures that would be undertaken during project implementation (FSM 2081.03, 11/29/95).

The Factors and Vectors considered in determining the risk level for the introduction or spread of noxious weeds are as follows:

Factors

A. Known noxious weeds in close proximity to project area that may foreseeably invade project
B. Project operation within noxious weed population
C. Any of vectors 1-8 in project area

Vectors

1. Heavy equipment (implied ground disturbance including compaction or loss of soil)
2. Importing soil/cinders/gravel/straw or hay mulch.
3. ORVs (off-road vehicles) or ATVs (all-terrain vehicles)
4. Grazing
5. Pack animals (short-term disturbance)
6. Plant restoration
7. Recreationists (hikers, mountain bikers, etc.)
8. Forest Service or other project vehicles

High-, moderate-, or low-risk rankings are possible. For the high ranking, the project must contain a combination of either factor A+C or B+C above. The moderate ranking contains any of vectors #1-5 in the project area. The low ranking contains any of vectors #6-8 in the project area or known weeds within or adjacent to the project area, without vector presence.

Table 3-68: Weed Risk Ranking Results

Project	Factors	Vectors	Risk Ranking
MHM Parking Lot Expansion and Enhancement Projects	A	1, 2, 3, 6, 7, 8	Moderate

3.9.3 Existing Condition

Spotted knapweed (*Centaurea maculosa*) is known to grow in the vicinity of the proposed project areas. Spotted knapweed is listed by the Oregon Department of Agriculture as a Category B designated weed (i.e., a weed of economic importance which is regionally abundant, but which may have limited distribution in some counties.

A small population of spotted knapweed has been documented in the Oregon Department of Transportation sand storage facility at the junction of Highway 35 and the Hood River Meadows access road. The site has been hand-pulled in the past with limited success. It has also been reported to ODOT for treatment that has been approved under the 2008 Record of Decision for Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia River Gorge National Scenic Area.

There is also a sparse population in the flowerbeds on the south side of the Mt. Hood Meadows Day Lodge. The plants have been hand-pulled annually by Mt. Hood Meadows personnel and Forest Service employees. The number of knapweed plants in the decreased over the years and in 2011 only three knapweed rosettes were found and were hand-pulled by the District Botanist. There are currently no other noxious weeds known to exist neither in the Mt. Hood Meadows Permit Area nor in the proposed project areas.

3.9.4 Effects Analysis/Environmental Consequences

The analysis area includes the entire Mt. Hood Meadows Permit Area (i.e., planning area). Short-term direct and indirect effects, if any, are estimated to occur in 1-5 years after project activity. Long-term effects, if any, are estimated to occur 5 years after project activity.

Criteria Used to Determine Effects include: 1) Presence of noxious weed species in or around the proposed project area; 2) Presence of vectors (listed above on page 7); 3) Potential for project to spread or introduce noxious weeds, 4) Potential for project to contribute to a cumulative increase of noxious weeds in the analysis area.

The analysis area is defined as the project area because potential for the spread and/or introduction of noxious weeds would be directly and indirectly related to activities proposed under Alternatives 2-5. Only the proposed projects or portions of projects proposed in this EIS that have direct or indirect effects are included in the following cumulative effects.

The spatial context for the effects analysis is the affected environment as described under Existing Conditions. The discussion of cumulative effects and the final determination of effects also consider the fact that the only two known populations of noxious weeds (e.g., spotted knapweed) in the analysis area have been (and continue to be) treated annually and are currently considered to be under control.

The temporal context depends on the existing or future project/activity – if there is an overlap in time from an effects perspective then it is included, if not it isn't.

Alternative 1 – No Action

Under the no action alternative there would be no direct or indirect effect as a result of not implementing the proposed project. The risk of introducing or spreading noxious weeds by project machinery directly or indirectly from outside the area would not occur because the project would not be implemented. New weed populations might continue to be spread or introduced by other vectors already present in the planning area (such as normal vehicular traffic and recreationists).

Effects Common to All Action Alternatives 2-6

Direct and Indirect Effects

Direct and indirect effects are common to all action alternatives because the potential vectors for spread/introduction of noxious weeds are essentially the same.

The nearest known noxious weed population of spotted knapweed is located around the outer edges of the ODOT sand storage facility area and in the flowerbeds on the south side of the Mt. Hood Meadows Day Lodge. Project activities are not expected to cause a direct spread of the knapweed from the known sites because the knapweed population (if still present in 2012 after several years of manual and herbicide control) would be pretreated prior to project activity (as stated in the DEIS Project Design Criteria).

All ground disturbing activities proposed under each action alternative could introduce and/or spread noxious weeds from outside the planning area; however, implementation of project design criteria/mitigation measures identified in the DEIS (i.e., washing machinery before entering the Mt. Hood National Forest and using gravel and mulch certified as "weed-free") would reduce the risk; annual monitoring for early detection would allow for application of appropriate control measures.

Cumulative Effects

Anticipated activities projected within the next five years occurring within the general analysis area might include road and parking lot maintenance, brushing of ski trails to maintain openings, machine application of sand/gravel on roads for seasonal traction, maintenance of underground utilities. All of these projects would to a certain degree present potential opportunities for noxious weeds/ invasive species to become established or spread. Past actions have proven it is unlikely that new infestations of noxious weeds would go undetected by the daily presence of Mt. Hood Meadows and/or Forest Service personnel in the analysis area, therefore cumulative effects (if any) are not expected to be significant with regard to noxious weed control.

3.9.5 Consistency Determination

Development of weed prevention practices is supported by U.S. Forest Service noxious weed policy FSM 2080. Forest Service policy is to prevent the introduction and establishment of noxious weed infestations, determine the factors that favor establishment and spread of noxious weeds, analyze weed risks in resource management projects, and design management practices to reduce these risks (FSM 2080.44). The USDA Forest Service Guide to Noxious Weed Prevention Practices identifies development of practices for prevention and mitigation during ground-disturbing activities such as forest vegetation management and road management (V.1 2001, pages 12-13 and 17) which are included in the project design criteria for this project.

Region 6 completed a Final Environmental Impact Statement (FEIS) for Preventing and Managing Invasive Plants in April 2005. In 2008, the Mt. Hood National Forest and Columbia River Gorge National Scenic Area completed a FEIS for Site- Specific Invasive Plant Treatments that would authorize herbicide use and an early detection/rapid response program. The knapweed site in the Oregon Department of Transportation sand and gravel storage facility at the junction of Highway 35 and the road to the Hood River Meadows Nordic Area parking lot has been approved for treatment under the 2008 FEIS.

Executive Order 13112 on Invasive Species (February 1999) requires federal agencies to use relevant programs and authorities to prevent the introduction of invasive species and not authorize or carry out actions that are likely to cause the introduction or spread of invasive species unless the agency has determined-- and made public--documentation that shows that the benefits of such actions clearly outweigh the potential harm. All feasible and prudent measures to minimize risk of harm would need to be taken in conjunction with the actions.

An additional authority for coordinated efforts to prevent and control the spread of Invasive Plants in Region 6 is the 1988 Final EIS for Managing Competing and Unwanted Vegetation.

3.9.6 Summary of Effects

Potential effects are common to all action alternatives because the potential vectors for spread/ introduction of noxious weeds are essentially the same among alternatives.

A Moderate Risk ranking (detailed on page 7) has been determined for each proposed action alternative for the following reasons: 1) Heavy equipment (implied ground disturbance including compaction or loss of soil); 2) Importing soil/cinders/gravel/straw or hay mulch; 3) ORVs (off-road vehicles) or ATVs (all-terrain vehicles) associated with project activity; 4) Plant restoration;

5) Recreationists (i.e., foot traffic associated and unassociated with the project); 6) Forest Service or other project vehicles.

The Moderate risk of spreading or introducing noxious weeds during project activities would be reduced by implementation of project design criteria/mitigations listed in the DEIS.

3.9.7 Incomplete and Unavailable Information

All information needed to perform this analysis is complete and available.

3.10 Cultural Resources

More information is available in the project record including the full cultural analysis file, as part of the Cultural Resources Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.10.1 Analysis Assumptions and Methodology

For the purposes of this analysis, cultural resources include both heritage resources and treaty rights. Heritage resources include structures, sites, and objects that reflect the prehistory, protohistory, and history of people. The analysis area for heritage resources in this EIS is the area of ground disturbance as proposed for all alternatives. The National Historic Preservation Act and the National Environmental Protection Act both require consideration be given to the potential effect of federal undertakings on heritage resources. The guidelines for assessing effects and for consultation are provided in 36 CFR 800. To implement these guidelines, in 2004, Region 6 of the Forest Service entered into a Programmatic Agreement (PA) with the Oregon State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (ACHP).

Treaty rights are those rights reserved by the Confederated Tribes of Warm Springs (CTWS) within the 1855 Treaty with the Tribes of Middle Oregon and the U.S. Government. The CTWS ceded lands as well as retained rights at usual and accustomed stations. Mt. Hood National Forest encompasses both ceded and usual and accustomed stations for the CTWS. The U.S. Government has a responsibility to honor those treaty rights, and also has a responsibility for the protection and enhancement of those resources important to the CTWS. For the purpose of providing a framework for Government-to-Government consultation and collaboration, the Region 6 of the Forest Service entered into a Memorandum of Understanding (MOU) with the CTWS in 2003, reaffirmed in 2008.

The proposed activities of the MHM project include tree removal, slash burning, utility line installation, grading and construction that involve heavy machinery and ground disturbance. In accordance with the 2004 agreement, heritage resource surveys have been conducted for those ground disturbing activities requiring inspection and documented in Heritage Resource Report 2013/060606/0013 (Dryden 2013). The surveys included all alternatives proposed for this project, and also included additional alternatives eventually dropped from further consideration. Also in accordance with the 2004 agreement, a site evaluation was documented in Heritage Resource Report 2013/060606/0014 (Dryden 2013).

The MHM Permit Area contains a culturally sensitive and important plant community, as indicated by the identifiable presence of huckleberry and beargrass. Huckleberries are culturally

significant and considered one of the CTWS "First Food" resource, both for sustenance and for ritual. Other Indian groups and individuals have also identified huckleberries as a significant cultural plant within their communities as well. The analysis area for huckleberries is the area of ground disturbance as proposed for all alternatives, but also includes the entire MHM Permit Area. While no quantitative huckleberry surveys have been conducted, qualitative estimates of this resource have been derived from professional judgment and inspection of the areas during the Heritage Resource surveys. For the purposes of this discussion, huckleberries will be used as an indicator species; any effects to huckleberries would be similar to other culturally important plant species in the area.

3.10.2 Existing Condition

Heritage Resources

The MHM Permit Area was likely utilized for resource collection by both historic and Native American groups at some time in the past; however, numerous past surveys proved mostly negative for cultural materials. The few nearby heritage resources that have been previously documented include historic fire rings, historic dendroglyphs, a protohistoric lithic isolate, a historic telephone line, the historic Mount Hood Loop Highway, and a stone shelter. A historic campground at Hood River Meadows constructed in 1924 was closed in the 1970s. A segment of the historic Mount Hood Loop Highway passes near the Hood River Meadows ski area. The heritage resource survey revealed the remains of a historic trail/road within the project area.

Treaty Rights

The proposed project occurs on lands ceded to the United States by the CTWS by the Treaty of 1855. The treaty reserves the rights of the CTWS to gather cultural foods; such as the Big or Black Huckleberry (Vaccinium Membranaceum Douglas), and other plant resources within the project area.

It is estimated that approximately 236 acres of previously closed canopy forest and 178 acres of previously open canopy forest have been disturbed within the Permit Area for the MHM ski development. Optimal huckleberry growth occurs between 3,300 and 6,000 feet above msl. (Stevens and Harris 2000), which includes most of the MHM Permit Area. There is no baseline data for huckleberry plants. Of these acres, it is estimated that less than 30% may have been suitable for productive huckleberry plants. Of those acres, probably 20% are easily accessible by Tribal members. Huckleberries continue to grow on the margins of openings around the main lodge and parking lot and continue to remain accessible by Tribal members. Some activities conducted by MHM, including ski run clearings, have produced suitable huckleberry habitat.

Huckleberry plants and beargrass are relatively plentiful within the proposed Twilight parking lot, and widely scattered through the proposed Sunrise Vehicle Maintenance Shop. The huckleberry plants within both locations have only moderate berry production, probably due to the heavy forest cover.

3.10.3 Effects Analysis/Environmental Consequences

No Action (Alternative 1) – Direct and Indirect Effects

Heritage Resources

Under the No Action Alternative, Heritage Resources would only be affected by decay and other natural and physical forces that are already occurring. This alternative would have no effect on heritage resources.

Treaty Rights

Existing huckleberry plants and beargrass would continue to grow under this alternative; however, maturing overstory would eventually shade out existing plants. Huckleberry plant quantity and quality would gradually decrease.

Proposed Action (Alternative 2) – Direct and Indirect Effects

Heritage Resources

The Hood River Meadows Segment of the Mount Hood Loop Highway (666EA0185) is situated adjacent to the improvements proposed in the Proposed Action. Proposed access roads would intersect the old highway. The portion of the historic highway between Highway 35 and the Hood River Meadows parking lot was determined to lack integrity and was evaluated as ineligible for inclusion on the National Register of Historic Places (NRHP) by East Zone Archaeologist Michael D. Dryden in 2009. The Oregon State Historic Preservation Office (SHPO) concurred with the evaluation of that portion of the highway segment on May 5, 2009. No protective measures are required or recommended for ineligible sites.

None of the other documented heritage resources would be affected by this alternative because they are not situated near any potential areas of impact.

Treaty Rights

It was estimated that huckleberry plants comprise approximately 65% of the existing ground cover within the proposed Twilight parking lot, and about 10% within the areas proposed for the Sunrise Vehicle Maintenance Shop. Huckleberry plants would be affected by any of the proposed paved or graveled areas; effects to beargrass and other plant resources would probably be similar. The Big or Black Huckleberries prefer about 30% canopy cover (Olsker 2012). Huckleberry plants are not found within the existing Nordic trails, probably due to continued mowing and brushing of the corridor and a lack of forest cover. Huckleberry plants would not be expected to prosper within the mowed portions of the proposed Nordic trails.

Approximately 10 acres of huckleberries would be permanently eliminated as a result of the implementation of the Proposed Action. However, existing huckleberries near the open clearing limits for Forest Development Road 3545 appear to be relatively healthier when compared with other interior shaded plants. Huckleberry plants along the margins of the proposed parking lot and Nordic trails would probably benefit from the increased sunshine. The “feathering” or 30% canopy closure retained within the margins of the Nordic trails and where possible along the parking lots would provide suitable huckleberry habitat. The Project Design Criteria also specifies that all open disturbed areas would be seeded with native seed, which includes species common to the huckleberry-beargrass plant association.

The CTWS responded in general support of the project (Calica 2011). Further consultation with the CTWS on March 12, 2012 resulted in modifications to the project design as well as the development of measures to mitigate the loss of huckleberry plants. The mitigation measures include the installation of signs asking the general public to honor tribal Treaty Rights with the Confederated Tribes of Warm Springs and to refrain from collecting huckleberries over a 13.5 acre area in the vicinity of the proposed improvements. The area represents the greatest possible loss of huckleberries in any of the action alternatives. If new huckleberry production does not increase adjacent to the Nordic trail or within the newly signed area, government-to-government consultation with the Confederated Tribes of Warm Springs may be re-initiated to discussion mitigation measures to offset the permanent loss of huckleberries resulting from this project. The mitigation measures also include educating the members of the Confederated Tribes of Warm Springs about production of the huckleberries and location of the new area within Mt. Hood Meadows Ski Resort Permit Area.

Alternative 3 – Direct and Indirect Effects

Heritage Resources

The effects from this alternative concerning heritage resources would be identical to those discussed for The Proposed Action.

Treaty Rights

While no inspection for huckleberries was conducted for the vehicle maintenance shop near the administrative building, the huckleberry habitat is similar to the habitat near the existing Sunrise Parking Lot, with huckleberries probably comprising about 10% of the ground cover. Approximately 14 acres of huckleberry plants would be permanently eliminated within the proposed Twilight and Sunrise locations as a result of the implementation of Alternative 3. However, huckleberry habitat would be improved along the margins of the parking lot and Nordic trails. As with the Proposed Action, the CTWS expressed support of the project with the mitigation measures.

Alternative 4 – Direct and Indirect Effects

Heritage Resources

The Sahalie Falls Trail (Forest Service Trail #667c) would be re-routed around the proposed parking lot to provide screening. The re-route (650 feet) parallels the existing route. The trail would remain a Class 3 trail for bike use. As such, the trail design parameters would be a trail width of 18 to 24-inches with a target trial grade of 3 to 10 percent and target cross slop of 3 to 8 percent. The trail would be a native surface trail. The total clearing limit would be six to eight feet in height and five to six feet in width. There would be no change to the existing trail head parking.

It was determined that the Sahalie Falls Trail is not over 50 years of age and, as such, is not considered a heritage resource. Re-routing the trail would not impact heritage resources. Otherwise, the effects from this alternative concerning heritage resources would be identical to those discussed for the Proposed Action.

Treaty Rights

While no inspection was conducted for the vehicle maintenance shop near the administrative building, the huckleberry habitat is similar to the habitat near the existing Sunrise Parking Lot,

with huckleberries probably comprising about 10% of the ground cover. Approximately 7 acres of huckleberry plants would be permanently eliminated within the proposed Twilight improvements as a result of the implementation of Alternative 4. However, huckleberry habitat would be improved along the margins of the parking lot and Nordic trails. As with Alternatives 2 and 3, the CTWS expressed support of the project with the mitigation measures.

Alternative 5 – Direct and Indirect Effects

Heritage Resources

The effects from this alternative concerning heritage resources would be identical to those discussed for Alternative 4.

The historic Elk Meadows Trail Road (666EA0280) lies immediately adjacent to improvements proposed for this alternative. The site was determined to lack integrity and was evaluated as ineligible for inclusion on the National Register of Historic Places (NRHP) by East Zone Archaeologist Michael D. Dryden. The Oregon State Historic Preservation Office (SHPO) review of the evaluation is pending. No protective measures are required or recommended for ineligible sites.

Treaty Rights

Approximately 10 acres of huckleberry plants in the vicinity of the proposed Twilight Parking Lot and about 0.25 acres of huckleberry plants in the vicinity of the proposed Sunrise improvements would be permanently eliminated as a result of the implementation of Alternative 5. However, huckleberry habitat would be improved along the margins of the parking lots and Nordic trails. As with Alternatives 2, 3, and 4, the CTWS expressed support of the project with the mitigation measures.

Alternative 6 – Direct and Indirect Effects

Heritage Resources

The effects from this alternative concerning heritage resources would be identical to those discussed for Alternative 4.

Treaty Rights

Approximately 11 acres of huckleberry plants in the vicinity of the proposed Twilight Parking Lot and about 0.25 acres of huckleberry plants in the vicinity of the proposed Sunrise improvements would be permanently eliminated as a result of the implementation of Alternative 6. However, huckleberry habitat would be improved along the margins of the parking lots and Nordic trails. As with Alternatives 2, 3, 4 and 5, the CTWS expressed support of the project with the mitigation measures.

Cumulative Effects – All Action Alternatives

Heritage Resources

For heritage resources, any effects are limited to site specific locations. Any cumulative effects would also be limited to heritage resources situated within proposed areas of ground disturbance. The project design criteria for the Proposed Action resulted in no direct or indirect effects to heritage resources since there are no significant heritage resources affected by any alternatives. For cumulative effects, all projects shown in Chapter 3 of the DEIS were considered; however, none

of the proposed projects involve heritage resources situated within the proposed project areas. Also, heritage resources are generally avoided for all federal undertakings with no cumulative effects. Because this project would have no effect on heritage resources eligible for the NRHP and none of the projects considered for potential cumulative effects overlap the affected area, there would be no cumulative effects to heritage resources as a result of implementing any of the action alternatives.

The consultation for the Heritage Resource Survey results and recommendations for the project, and for the Determination of Eligibility (DE) for the Elk Meadows Trail Road (666EA0280) has been conducted with the Oregon State Historic Preservation Office (SHPO) in accordance with the 2004 PA. The results of the SHPO review are pending.

Tribal Rights

For cumulative effects to huckleberries, any cumulative effects would be limited to the MHM Permit Area. All projects shown in Table Chapter 3 of the DEIS were considered for cumulative effects. Although some huckleberries have benefitted from MHM management practices and huckleberries would be expected to partially recover in the open habitat along the parking lot and the Nordic trails, there would probably be an overall net loss of huckleberry plants through the implementation of this project. Of the projects considered for cumulative effects, only the Clark Newton Creeks Betterment Project has removed huckleberry habitat along the margins of Oregon State Highway 35. The cumulative effect of these projects would reduce a diminishing resource. Because there is no established threshold for loss of acres of huckleberries, such a threshold would be determined in consultation with the CTWS. As with the action alternatives, the CTWS expressed support of the project with the mitigation measures.

3.10.4 Consistency Determination

Heritage Resources

The project would not impact any significant heritage resources. Based on the proposed protective measures, the project meets the criteria in the Programmatic Agreement for "No Historic Properties Affected" determination (Stipulation III (B) 5).

This action is consistent with Forest Plan goals to protect important heritage resources. Heritage resource inventories were conducted in compliance with the 2004 PA during the project planning stage (FW-602 and FW-606), the field survey results were fully documented (FS-608), and the potential effects to heritage resources from the proposed projects were assessed (FW-609, FW-610). Heritage resources potentially affected by project activities were evaluated as ineligible for inclusion on the NRHP (FW-612). All records and documents concerning heritage resources for the project are kept on file at the Hood River Ranger District, Mt. Hood National Forest (FW-626).

Treaty Rights

The Mt. Hood National Forest and the CTWS have coordinated during the development of the EIS for this project (MOU-III (D). The CTWS was contacted by the Mt. Hood National Forest prior to public scoping (MOU-Appendix A (A-1). The CTWS have commented on the proposed project and collaboratively developed mitigation measures for the treatment of huckleberries (MOU-Appendix A (A-2, A-3(c)).

The CTWS was notified about the project prior to administrative actions that may have adversely affected areas associated with traditional religious values (FW-633). The CTWS participated in collaboratively developing mitigation measures to minimize impacts to culturally significant resources (FW-634), which is also consistent with Forest Plan goals to honor the Treaty Rights and privileges of Native Americans (FW-630).

3.10.5 Summary of Effects

Heritage Resources

Under the No Action Alternative, heritage resources would continue to be subject to naturally occurring processes. Huckleberry plants would continue to grow, but would probably become less productive from the increasing shade of maturing overstory. Alternatives 2 through 6 would have no effect on Heritage Resources.

Treaty Rights

The improvements proposed in Alternatives 2 through 6 would permanently remove from 6 to 14 acres of huckleberry plants; however, some huckleberry rejuvenation may occur along the open margins of the parking lots and Nordic trails. The Project Design Criteria also specifies that all open disturbed areas would be seeded with native seed, which includes species common to the huckleberry-beargrass plant association. Mitigation measures developed in collaboration with the CTWS have minimized impacts to culturally significant plant resources.

3.10.6 Incomplete and Unavailable Information

All information needed to perform this analysis is complete and available.

3.11 Visual Management

More information is available in the project record including the full recreation analysis file, as part of the Visual Management Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.11.1 Analysis Assumptions and Methodology

The effects analysis for this report is based on published information, field surveys, and coordination with Mt. Hood Meadows Ski Resort Staff. The area used for this analyze is Mt Hood Meadows Permit Area and the developed recreation sites along Highway 35. Analysis of the project area was completed by using Geographic Information System (GIS) data maintained by the Mt. Hood National Forest (Forest).

Overall guidance was obtained from the Visual Management System (Agriculture Handbook 462), and National Forest Landscape Management Ski Areas (Agriculture Handbook 617). Effects are evaluated with the Visual Quality Objectives (VQOs) outlined in the Land and Resource Management Plan (Forest Plan) and the Master Plan which amended the VQOs within the Permit Area. Forest Service direction provides the following definitions of VQO categories (Agriculture Handbook 462):

1. Preservation (P) – This VQO allows ecological changes only. Management activities, except for very low visual impact recreation facilities, are prohibited.
2. Retention (R) – This VQO provides for management activities which are not visually evident. Under Retention activities may only repeat form, line color and texture which are frequently found in the characteristic landscape.
3. Partial Retention (PR) – Management activities remain visually subordinate to the characteristic landscape. Activities may repeat or introduce form, line, color, or texture common to the characteristic landscape and may change their qualities of size, amount, intensity, direction, pattern, etc., so long as they remain visually subordinate to the characteristic landscape.
4. Modification (M) - Under the modification VQO management activities may visually dominate the original characteristic landscape however, they should borrow from naturally established form, line, color and texture so completely and at such a scale that the visual characteristics are compatible with the natural surroundings.

Factors being analyzed include:

1. Land Allocation (A-11) Visual Quality Objectives;
2. Trail Visual Quality Objectives; and,
3. Designated Viewsheds.

3.11.2 Existing Condition

The proposed project is located within Mt Hood Meadow Ski Resort (MHM) Permit Area. Overall, the resort is visually dominated by Mt. Hood itself, Oregon's highest peak, towering to 11,245 feet. In order to achieve the desired character for an area, it is important to first identify its landscape features in terms of its elements including form, line, color, and texture.

- Form - The strongest forms within the permit boundary consist of those created by the existing structures, tree masses and ski runs.
- Line - Dominate lines consist of ridgelines, timberlines, avalanche paths, ski runs, lifts, utilities, and roads.
- Color – During the winter season the stark contrast of the snow covered ski runs against that of the dark green tree masses provide the dominate colors of the natural landscape. During the remainder of the year the colors blend as the lighter green of low growing vegetation ties into the darker green tree masses, rocky outcrops and ridgelines. The resort developments general harmonize with their natural surroundings.
- Texture - Texture dominance also varies with distance and change of season. The smooth surfaces of groomed runs give way to the more complex textures of low growing shrubs and naturally occurring rock outcroppings.

As with all downhill ski areas, landscape alterations are visible due the clearing of ski run, road construction, parking area construction, base areas, skier service facilities and associated structures. A variety of methods have been incorporated to lessen visual impacts and retain as much of the natural character as possible. These include vegetative screening, feathering and scalloping of ski run edges, thinning or glading of timber, and creating natural-appearing openings that resemble the characteristics of the natural landscape.

Land Allocation (A-11) Visual Quality Objectives

The Land Use Allocation within this planning area is A11-Winter Recreation Area. Overall management direction for these areas require Nordic ski centers, developed downhill ski areas, parking lots, and other developed facilitates to achieve Partial Retention Visual Quality Objectives (VQO) as viewed from Highway 35, and old Highway 35 (Forest Road 3545 also known as the Sahalie Falls Road). Partial Retention is defined as management activities are visually evident but subordinate to the characteristic landscape, when managed according to the partial retention visual quality objective. Activities may repeat form, line, color, or texture common to the characteristic landscape but change in their qualities of size, amount, intensity, direction, pattern, etc., remain visually subordinate to the characteristic landscape.

Trail Visual Quality Objectives

VQOs are also assessed from Forest Service System Trails. Distance zones are prescribed unless screened by topography. The Master Plan defines the VQO for the Permit Area as Modification in the foreground as viewed from Timberline and Umbrella Falls Trails. Under the modification VQO, management activities may visually dominate the original characteristic landscape. Activities of vegetative and land form alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area or character type.

Designated Viewsheds

A designated viewshed also exists along Highway 35 traveling north from Bennett Pass. In this case, the designated viewshed is defined as the total landscape seen or potentially seen from the recreation sites along Highway 35. Potential Recreation site that exist within the vicinity of the project area include: Bennet Pass Sno-Park and Tea Cup Sno-Park. For this analysis these two locations would serve at the Key Observation Points (KOP). The Clark Creek Sno-Park was decommissioned (flood damage) as part of the Highway 35 Betterment Project. The VQO for the Highway 35, North Bennett Pass viewshed is Retention in the Foreground and Partial Retention in the Middle and Backgrounds.

Retention VQOs provide for management activities which are not visually evident. Under Retention VQO, activities may only repeat form, line, color, and texture which are frequently found in the characteristic landscape. Changes in their qualities of size, amount, intensity, direction, patter, etc., should not be evident.

Table 3-69: VQOs for A11 Winter Recreation Management Areas (Forest Plan) (PR = Partial Retention; M = Modification; and R = Retention).

Observation Areas	Near Foreground (within 660')	Far Foreground (660'-1320')	Middle-ground (1320' to 5 miles)	Background (greater than 5 miles)
Land Allocation (A-11) VQOs from View Routes (Highway 35 & Rd 3545)	PR	PR	PR	PR
Trail VQOs Timberline Trail and Umbrella Falls Trail*	M*	M*	M	--
Designated Viewshed Highway 35, N. Bennett Pass DV**	R	R	PR	PR

*Timberline and Umbrella Falls trails foreground VQOs within the MHM Permit Area were amended by the 1996 Master Plan from Partial Retention to Modification.
**As view from FS Recreation Sites including Bennett Pass and Teacup Sno-Parks.

3.11.3 Effects Analysis/Environmental Consequences

Alternative 1: No Action Alternative

No actions would be implemented, so there would be direct or indirect effects to the visual resources and the VQO would remain unchanged.

All Action Alternatives – Direct and Indirect Effects

Land Allocation (A-11) Visual Quality Objectives
The VQO of Partial Retention would be achieved as viewed from Highway 35. All actions occur within 5 miles of the Highway 35. With the exception of the left-hand and right-hand turn lanes, none of the actions proposed or connected actions would be visible from Highway 35 as show in the following table. The proposed left-hand and right-hand turn lanes would repeat the form, line, color, or texture of the existing roadway. It would remain visually subordinate to the surrounding characteristic landscape.

Table 3-70: Partial Retention Distances Zones as Viewed from Highway 35. (PR = Partial Retention

Action	Near Foreground (within 660′)	Far Foreground (660′ to 1320′)	Middle-ground (1320′ to 5 miles)	Background (greater than 5 miles)
Right-turn Lane	PR			
Left-turn Lane	PR			
Twilight Parking Lot		PR		
Twilight Equipment Maintenance Yard & Shop Building		PR		
Sunrise Vehicle Maintenance Shop			PR	
Nordic Trail Construction		PR		
Nordic Guest Services Building		PR		
Sahalie Falls Hiking Trail		PR		
Utility Lines – Power, water, etc…		PR	PR	

The VQO of Partial Retention would be achieved as viewed from Highway Forest Service Road (FSR) 3545. All aspects of the proposed action would be screened by natural vegetation from FSR3545 with the exception of the Twilight Equipment Maintenance Yard & Shop Building and the access road into the proposed parking area. These management activities would be visually evident but subordinate to the characteristic landscape due to partial screening (see Figure 3-21 and Table 3-70).

Figure 3-21: Twilight Parking Area as seen from Elk Meadows Parking Area.

Table 3-71: Partial Retention Distances Zones as Viewed from Forest Road 3545 (Sahalie Falls Road). (PR = Partial Retention

Action	Near Foreground (within 660')	Far Foreground (660' to 1320')	Middle-ground (1320' to 5 miles)	Background (greater than 5 miles)
Right-turn Lane	PR			
Left-turn Lane	PR			
Twilight Parking Lot	PR			
Twilight Equipment Maintenance Yard & Shop Building	PR			
Sunrise Vehicle Maintenance Shop			PR	
Nordic Trail Construction	PR			

Table 3-71: Partial Retention Distances Zones as Viewed from Forest Road 3545 (Sahalie Falls Road). (PR = Partial Retention (Continued)

Action	Near Foreground (within 660')	Far Foreground (660' to 1320')	Middle-ground (1320' to 5 miles)	Background (greater than 5 miles)
Nordic Guest Services Building	PR			
Sahalie Falls Hiking Trail	PR			
Utility Lines – Power, water, etc…	PR			

Trail Visual Quality Objectives

All trails would either be screened from view by topography or meet the VQO of Modification. Activities of vegetative and land form alteration would borrow from naturally established form, line, color, or texture. Repetitive clearing patterns that would result in straight lines, edges, or geometric shapes of vegetation patterns and opening would be avoided.

Table 3-72: Trails Evaluated for VQO. [MG = Middleground (1320' to 5-miles); M = Modification]

View Points	Distance	VQO
Timberline Trail	MG	M
Pacific Crest National Scenic	MG	M
Elk Meadow Trail	MG	M
Gnarl Ridge Trail	MG	M
Barlow Butte Trail	MG	M
White River Trail	MG	M
Gunsight Butte Trail	MG	M
Bennett Pass Trail	MG	M
Sahalie Falls Trail	FG	M
Bluegrass Ridge Trail	MG	M
Umbrella Falls Trails	MG	M

Designated Viewsheds

Management activities would occur within the designated viewshed; however, they would not be visually evident from the existing recreation sites. The left- and right-turn lanes and Nordic Ski Trail construction would occur within the Foreground of Teacup Sno-Park. All other activities would occur within the Middleground of all three Sno-Parks.

Table 3-73: VQO's as view from Recreation Sites along Highway 35, N. Bennett Pass

Action	Near Foreground (within 660')	Far Foreground (660' to 1320')	Middleground (1320' to 5 miles)	Background (greater than 5 miles)
Right hand Turn Lane		R		
Left hand Turn Lane		R		
Twilight Parking Lot			PR	
Twilight Equipment Maintenance Yard & Shop Building			PR	
Sunrise Vehicle Maintenance Shop			PR	
Nordic Trail Construction		R		
Nordic Guest Services Building			PR	
Sahalie Falls Hiking Trail			PR	
Utility Lines – Power, water, etc…			PR	

Figure 3-22: Left- and Right-turn Lanes as viewed from the Key Observation Point (KOP) at Teacup Sno-Park.

Figure 3-23: Vegatiative screening at Bennet Pass Sno-Park (KOP)

All Action Alternatives – Cumulative Effects

The cumulative effects for this project would be the same for all alternatives. The spatial area considered for recreation resources is the Permit Area and surrounding Sno-Parks/developed recreation sites. The rationale for this boundary is the interconnection between the developed recreation sites along Highway 35 and Highway 35 designated viewshed. The temporal boundary considered for recreation resources is dependent on the existing or future project/activities if there is an overlap in time from an effects perspective then it is included in this analysis. Cumulative effects are outlined in the table below.

Table 3-74: Cumulative Effects for Visuals

Project Considered for Cumulative Effects	Potential Effects	Overlap in		Measurable Cumulative Effect Described Below?
		Time	Space	
Highway 35 betterment projects	Designated Viewsheds	Yes	Yes	Yes
Meadows Creek Highway 35 and Teacup Roads culverts	Designated Viewsheds	Yes	Yes	Yes
Teacup grooming activities	None	Yes	Yes	No
Bluegrass Ridge and Dollar Lake Complex Fires	None	No	No	No
Stadium Lift realignment	Trail Visual Quality Objectives	Yes	Yes	Yes

Table 3-74: Cumulative Effects for Visuals (Continued)

Project Considered for Cumulative Effects	Potential Effects	Overlap in		Measurable Cumulative Effect Described Below?
		Time	Space	
Buttercup Lift improvements	Trail Visual Quality Objectives	Yes	Yes	Yes
Annex Wetland restoration at Sunrise	Land Allocation (A-11) Visual Quality Objectives	No	Yes	No
General on-going road maintenance including winter road treatments	None	Yes	Yes	No
General on-going Permit Area activities	None	Yes	Yes	No
Sahalie Falls bridge stabilization	Designated Viewsheds	Yes	Yes	Yes
Pre-commercial thinning	None	No	No	No
Avalanche control	None	Yes	Yes	No

Land Allocation (A-11) Visual Quality Objectives

The Annex Wetland restoration at Sunrise and the existing parking lots at MHM were considered part of the existing condition; therefore, no cumulative effects would occur to the overall Visual Quality Objective of Partial Retention prescribed for A-11 Winter Recreation Areas.

Trail Visual Quality Objectives

The Stadium Lift realignment and the Buttercup Lift Improvements combined with the actions associated with Mt. Hood Meadows Parking Improvements would cumulatively increase visual contrast of the developed ski resort from the natural environment as seen from the timberline trail. The overall VQO (cumulative effect rating) of modification; however, would continue to be achieved.

Designated Viewsheds

Highway 35 betterment projects, Meadows Creek Highway 35 and Teacup Roads culvert replacement, and the Sahalie Falls bridge stabilization combined with the right-hand and left-hand turn lanes as proposed in this project would all occur within the foreground. Cumulatively, these management actions would not be visually evident or would not dominate the characteristic landscape to the casual forest visitor as seen from the key observation points (developed recreation sites) along Highway 35 and would therefore be in compliance with the VQO requirements.

3.11.4 Consistency Determination

U.S. Forest Service Manual 2300, Chapter 2380 Landscape Management, 2380.3 outlines the following policies: Inventory, evaluate, manage, and, where necessary, restore scenery as a fully integrated part of the ecosystems of National Forest System lands and of the land and resource management and planning process; Employ a systematic, interdisciplinary approach to scenery management to ensure the integrated use of the natural and social sciences and environmental design; Ensure scenery is treated equally with other resources; and, Apply scenery management principles routinely in all National Forest System activities. This project is consistent with this manual direction.

U.S. Forest Service Manual 2300, Chapter 2380 Landscape Management, 2382.4 - Applications to Project Management: Refer to the Agriculture Handbook series on Landscape Management (FSM 2380.61) as guidance in project-level work to: Determine how scenery management techniques and principles can be used in the planning, design, and construction of winter sports developments to achieve and maintain desired scenic integrity objectives and landscape character goals; Plan, design, and construct recreation sites and facilities so that they contribute positively to visitors' expectations and experiences and so that they integrate visually into the forest landscape with minimum adverse impact to scenery; and, Determine how scenery management techniques and principles can be used to mitigate any land altering activity or introduced elements on the land, to achieve and maintain desired scenic integrity objectives and landscape character goals. This project is consistent with this manual direction.

U.S. Forest Service 1990. Land and Resource Management Plan, Mt. Hood National Forest. Identifies Visual Quality Objectives for management areas, as seen from identified view routes, points and trails. This project is consistent with these Forest Plan standards and guidelines.

Record of Decision, Mount Hood Meadows Ski Area Master Plan Final Environmental Impact Statement, Forest Plan Amendment No. 10, Decision and Required Mitigation. The ROD amended the VQO for the MHM Permit Area as seen from the Timberline and Umbrella Falls trails from Partial Retention to Modification in the foreground. The ROD also identified required mitigations for visual resources. This project is consistent with this manual direction.

3.11.5 Summary of Effects

Table 3-75: Scenic Direct and Indirect Effects Summary

	Type of Effect	In Compliance with Forest Plan VQO?
Land Allocation (A-11) VQOs from View Routes (Highway 35 & Rd 3545)	Highway 35 Left- and right-turn lanes & Twilight Bus Maintenance Shop Building would be visible from View Routes. FS Road 3545 Twilight Equipment Maintenance Yard and the access road into the proposed parking area would be visible.	Partial Retention VQO - Yes
Trail VQOs Timberline Trail and Umbrella Falls Trail*	Parking Area and associated facilities would be visible from trails.	Modification VQO - Yes
Designated Viewshed Highway 35, N. Bennett Pass	Left- and right-turn lanes and Nordic Ski Trail construction would occur within the foreground of Teacup Sno-Park; however, it would be screened by existing vegetation. All other activities would occur within the Middleground of all three Sno-Parks	Retention VQO –Yes

3.11.6 Incomplete and Unavailable Information

All information needed to perform this analysis is complete and available.

3.12 Vegetation Management

More information is available in the project record including the full silviculture analysis file as part of the Silvicultural Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.12.1 Analysis Assumptions and Methodology

The analysis area boundary for disclosing effects on the vegetation resources at this more site-specific level is the Upper East Fork Hood River subwatershed, where the proposed treatments locations were evaluated.

Forested Plant Associations of the Westside Central Cascades of Northwestern Oregon was used to analyze the effects of proposed treatments. Plant association classification describes repeating patterns of plant communities that indicate different biophysical environments. The combinations of factors such as moisture and temperature regimes, light, and soil nutrients provide habitat for a group of plant species. There are few distinct boundaries along the environmental continua. However, categorizing discrete plant associations provides a means to track and predict vegetation composition, structure, and response to disturbance. Plant association classification of forested

lands has been a forest management tool for many years. Ecosystem management and concerns with biodiversity also require understanding the plant and animal habitats that occur across our landscapes.

3.12.2 Existing Condition

The project area for the Twilight Parking Lot alternatives ranges from 4300 feet to 4600 feet in elevation on the south eastern region of Mt. Hood. The area is comprised predominantly of uneven-aged stands with Douglas-fir, western larch, grand fir, mountain hemlock, and Pacific silver fir, with a variety of age classes represented. The area is predominantly with in mountain hemlock/big huckleberry and pacific silver fir/big huckleberry/beargrass plant associations. Common in these plant associations is an overstory dominated by Douglas-fir, Pacific silver fir, and mountain hemlock and an understory dominated by Pacific silver fir and mountain hemlock. Also, both association's shrub and herbaceous cover consist of huckleberry and beargrass. Currently the project area is averaging between 200 to 280 ft^2 of basal area with around 500 to 700 stems per acre and an average quadratic mean diameter of 9.0 inches. The average stand height ranges from 70 to 100 feet tall with an average canopy closer of 70 percent. The overall average stand age is between 150 to 180 years old with less than 4 snags per acre larger than 12 inches DBH

The project area for the Sunrise parking area ranges from 4300 feet to 4600 feet in elevation on the south eastern region of Mt. Hood. The area is comprised predominantly of uneven-aged stands with Douglas-fir, subalpine fir, whitebark pine, mountain hemlock, and Pacific silver fir, with a variety of age classes represented. This area is within mountain hemlock parkland plant associations. Common in this plant association is an overstory dominated by Pacific silver fir, and mountain hemlock and an understory dominated by Pacific silver fir and mountain hemlock. Whitebark pine is a part of this plant association in minor amounts for both the overstory and understory. Also, this association's shrub and herbaceous cover consist of huckleberry. Currently the project area is averaging between 200 to 280 ft^2 of basal area with around 700 to 800 stems per acre and an average quadratic mean diameter of 10.0 inches. The average stand height ranges from 70 to 100 feet tall with an average canopy closer of 80 percent. The overall average stand age is between 131 to 150 years old with less than 2 snags per acre larger than 12 inches DBH

According to the Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (2001 Survey and Manage ROD) "old-growth" is defined an ecosystem distinguished by old trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include tree size, accumulations of large dead woody material, number of canopy layers, species, composition, and ecosystem function. More specific parameters applicable to various species are available in the U.S. Forest Service, Region 6, 1993 Interim Old Growth Definitions (USDA Forest Service Region 6, 1993). The Northwest Forest Plan Supplemental EIS and FEMAT (Forest Ecosystem Management Assessment Team) describe old-growth forest as a forest stand usually at least 180 to 220 years old with moderate-to-high canopy closure; a multi-layered, multi-species canopy dominated by large overstory trees; high incidence of large trees, some with broken tops and other indications of old and decaying wood (decadence); numerous large snags; and heavy accumulations of wood, including large logs on the ground (USDA, USDI 1994a). The two areas

within the proposed project area are missing key components of the "old growth definitions". Mainly stand age and the lack of large diameter snags and down wood are missing.

3.12.3 Effects Analysis/Environmental Consequences

The baseline condition against which changes to the vegetation would be measured is the existing condition. Criteria used to determine effects on vegetation include: (1) total acres treated and acres treated within each affected forest; (2) changes in forest structure and composition; and (3) effects on residual trees. This section only analyzes the impacts of the vegetation management treatment.

No Action (Alternative 1)

Under the No Action Alternative, stands would continue to progress through natural successional stages that are already occurring. There would be no forested lands removed. This alternative would have no effect on vegetation resources. Existing huckleberry plants would continue to grow under this alternative; however, maturing overstory would eventually shade out existing plants.

Proposed Action (Alternative 2)

Only approximately 16 acres of forested land would be removed, so there would be no considerable change in the forest structure for the plant association within the analysis area. During the tree removal process, all residual trees would be protected from major damage. Residual trees left would have an increase in growth from the canopy openings and reduction in stocking levels. Overall, this alternative would have no considerable effect on vegetation resources.

Huckleberries are an important part of the plant association. Approximately 10 acres of huckleberry plants would be permanently eliminated as a result of the implementation of this alternative. Huckleberry plants along the edges of the proposed actions would benefit from the reduction in canopy closure. It is important for the huckleberry to comprise a minimum of approximately 20 percent ground cover across 80 to 90 percent of the plant association. Again due to the minimal amount of acreage being treated in this alternative, there would be no considerable effect.

All logging activities would be ground based operations. Landing and skid trails would be focused in areas that would be paved or existing trails that would be groomed. All skidding that is required would be on new or existing trails. Residual trees would need to be protected during all skidding operations.

New Nordic Trails (Alternative 3)

This alternative would remove approximately 22 acres of forested lands. The effects from this alternative would be identical to those discussed for Alternative 2. There would be no considerable change in the forest structure for the plant association within the analysis area.

Elk Meadow Master Plan (Alternative 4)

This alternative would remove approximately 9.4 acres of forested lands. The effects from this alternative would be identical to those discussed for Alternative 2. There would be no considerable change in the forest structure for the plant association within the analysis area.

Elk Meadow (Alternative 5)

This alternative would remove approximately 17 acres of forested lands. The effects from this alternative would be identical to those discussed for Alternative 2. There would be no considerable change in the forest structure for the plant association within the analysis area.

Preferred Alternative (Alternative 6)

This alternative would remove approximately 10.7 acres of forested lands. The effects from this alternative would be identical to those discussed for Alternative 2. There would be no considerable change in the forest structure for the plant association within the analysis area.

Cumulative Effects

Discussions of the cumulative effects are limited to those past, present and reasonably foreseeable activities that have been determined to have a cumulative effect on the vegetative resource.

The proposed actions would result in no direct or indirect effects to vegetation resources since there are no considerable affected by any alternatives. For cumulative effects, all projects shown in the table found in EIS Chapter 3 were considered. Only projects with effects to vegetation within the Permit Area were considered. As such, there would be no measurable cumulative effects for the vegetation recourse.

3.12.4 Consistency Determination

All of the action alternatives proposed would meet the goals and objectives of the Mt. Hood National Forest Land and Resource Management Plan (Forest Plan) as defined by A-11 Winter Recreation Areas Management Area Direction as amended, including Standards and Guidelines, Northwest Forest Plan, and Survey and Manage 2001 Record of Decision. A vegetation management plan would need to be prepared to be consistant with required mitiagtion measures from the Mt. Hood Meadows Ski Area Master Plan (Forest Plan Amendment No. 10) page A-7. All action alternatives proposed are consistant with the required mitigation and monitoring found in the Mt. Hood Meadows Ski Area Master Plan (Forest Plan Amendment No. 10) A-6 through A7

NFMA Findings for Vegetation Manipulation

As required by regulations (FSH 1909.12 5.31a), all proposals that involve vegetative manipulation of tree cover comply with the seven requirements found in 36 CFR 219.27(b) by following the standards and guidelines identified for Management Areas 4 and 11

Suitability for Timber Production

Silvicultural diagnosis process, stand examinations are conducted to determine existing stand conditions, and a determination of suitability (in regard to management of the stand for timber production) is made for each stand. Stands proposed for treatment were examined for suitability in accordance with 36 CFR 219.13, Timber resource land suitability. Stands were found to be suitable for timber management based upon the following:

Meet the definition of forestland as described in 36 CFR 219.3.

Technological feasibility exists to ensure soil productivity and watershed protection. All sites considered for treatment would use established harvesting and site preparation methods. In combination with resource protection standards in the Forest Plan and applicable Best Management Practices, these methods would be sufficient to protect soil and water resource values.

Maximum Harvested Acres (36 CFR 219.12 (k)(5)(iii), 219.27 (d)).

Ensure that no timber harvesting occurs on lands classified as not suited for timber production, except for salvage sales or sales necessary to protect other multiple-use values where the Forest Plan establishes that such actions are appropriate (36 CFR 219.27 (c) (1)). The proposed actions meet the forest plan requirement for less than 40 acres of created openings.

3.12.5 Incomplete and Unavailable Information

All information needed to perform this analysis is complete and available.

3.13 Air Quality

3.13.1 Analysis Assumptions and Methodology

The following effects analysis utilizes research, relevant monitoring, field data and modeling to provide a context, amount and duration of effects for each of the alternatives. GIS analysis and additional modeling was completed for a variety of site conditions and parameters in the project area.

The following assumptions are utilized in the analysis:

- All Best Management Practices (BMP) and Project Design Criteria (PDC) listed in EIS, Chapter 2 would be fully implemented and effective.
- The areas of impact outlined in EIS, Chapter 2 are the actual areas of disturbance.
- Monitoring effectiveness of PDC and compliance would be a component of project implementation.

3.13.2 Existing Condition

Air quality is typically characterized by the range of concentrations of various pollutants within the air at the project site, or at a location representative of the project site. Although there are hundreds of chemicals which exist in the air, the US EPA has established national ambient air quality standards (NAAQS) for only a small number of pollutants: lead (Pb), ozone (O3), carbon monoxide (CO), sulfur dioxide (SO2), nitrogen dioxide (NO2), and particulate matter (PM) with aerodynamic diameters of less than 10 microns (PM10) and less than 2.5 microns

(PM2.5). Primary standards are designed to be protective of human health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards are established to protect the public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. States have the right to set additional standards, but cannot be less stringent than the federal standards. Table 3-76 presents a summary of the federal and state ambient air quality standards.

Table 3-76: State and Federal air quality standards.

Pollutant	National		Oregon State
	Primary	Secondary	
Lead (Pb)			
Quarterly Average PM10	1.5 µg/m3	1.5 µg/m3	1.5 µg/m3
24-hour Average PM2.5	150 µg/m3	150 µg/m3	150 µg/m3
Annual Arithmetic Mean	15 µg/m3	15 µg/m3	15 µg/m3
24-hour Average	35 µg/m3	35 µg/m3	35 µg/m3
Sulfur Dioxide (SO_2)			
Annual Average	no standard	no standard	0.02 ppm
24-hour Average	no standard	no standard	0.10 ppm
3-hour Average	no standard	0.5 ppm	0.50 ppm
1-hour Average	0.075 ppm	no standard	no standard
Carbon Monoxide (CO)			
8-hour Average	9ppm	no standard	9 ppm
1-hour Average	35 ppm	no standard	35 ppm
Ozone (O_3)			
8-hour Average	0.075 ppm	0.075 ppm	0.075 ppm
Nitrogen Dioxide (NO_2)			
Annual Average	0.053 ppm	0.053 ppm	0.053 ppm
1-hour	0.100 ppm	no standard	no standard

Source: www.epa.gov/air/criteria.html and Oregon Administrative Rule (OAR) 340-202 Ambient Air Quality Standards, queried March 20, 2012.
Notes: Primary standards are listed in this table as they appear in the federal regulations; ambient concentrations are rounded using the next higher decimal place to determine whether a standard has been exceeded. The data in this report are shown with these unrounded numbers.
[a]Annual standards never to be exceeded, short-term standards not to be exceeded more than once per year unless noted.
[b]Not to be exceeded on more than 1.0 days per calendar year. ppm = parts per million µg/m3 = micrograms per cubic meter.

In addition to these ambient air quality standards, Oregon also has an ambient standard for particle fallout. Particle fallout is the amount of a particular substance that is temporarily suspended in air, but ultimately falls to the ground and is deposited on the earth's surface. The particle fallout rate as measured by an Oregon State standard method at a location approved by the Department of Environmental Quality (DEQ) must not exceed:

(1) 10 grams per square meter per month in an industrial area.
(2) 5.0 grams per square meter per month in an individual area, if visual observations show a presence of wood waste or soot and the volatile fraction of the sample exceeds 70 percent.
(3) 5.0 grams per square meter per month in residential and commercial areas.
(4) 3.5 grams per square meter per month in residential and commercial areas if visual observations show the presence of wood waste or soot and the volatile fraction of the sample exceeds 70 percent.

Oregon DEQ maintains a network of ambient air quality monitors throughout Oregon. As of 2010, the nearest ambient air quality monitors for PM10, PM2.5, SO2, NO2, CO, O3 are located in Portland. Based upon this site and other monitoring sites across the state, Oregon made the following summary statements about the ambient air quality.

- PM2.5 (particulate matter 2.5 micrometers in diameter and smaller) was below the federal health level throughout Oregon. The three year average used for comparison to the federal health standard remains above the daily standard in Klamath Falls, Lakeview, and Oakridge.
- Ground level ozone (smog) exceeded the federal standards twice in Portland and once in Salem. They did not violate the standard which requires four exceedance days.
- Forest Fire smoke was light in 2010 and did not exceed the federal health standard anywhere ODEQ monitored.
- Smoke from a prescribed burn impacted Lakeview, Sisters, and other rural areas.
- Air toxics, such as benzene and acetaldehyde, remain near or above the health benchmarks. The health benchmarks are concentration levels at which, if exposed over a lifetime, an individual's risk of getting cancer is increased by one in a million.
- Carbon monoxide and PM10 (particulate matter 10 micrometers diameter and smaller) remained far below the federal health standard. The pollutants have been trending down in the past 10 to 15 years.

In 2011, smoke from the Dollar Lake wildfire on the Mt. Hood National Forest caused elevated levels of PM locally and regionally, and very likely within the project area.

Additionally, the U.S. Forest Service monitors air quality related values in the area surrounding the project, but not within the project area. The Forest Service operates a visibility camera located at the Timberline Ski Area; an Interagency Monitor for the Protection of Visual Environments (IMPROVE) monitor located on top of Mt. Hood Ski Bowl and in the Columbia River Gorge; and conducts lichen biomonitoring sampling throughout the Forest as well.

The IMPROVE monitor is located just south of the wilderness boundary near Government Camp, at an elevation of 5,022 feet. The 2000 to 2004 monitoring data from this site illustrate that in general, the best visibility occurs during the winter, and the worst visibility occurs during the summer. Organic carbon likely from fires is the largest contributor to haze. Soil, such as what may be emitted from road dust, contributes very little to haze.

The project area lies in close proximity to the Mt. Hood Wilderness, a mandatory federal Class I Area. Because Class I areas receive the greatest level of protection under the Clean Air Act, incremental increases in the concentration of PM, NO2, and SO2 are more restricted than in other lands.

Existing sources of air pollution in the project area include automobile, bus, and truck exhaust, combustion gases and particles from the operation of restaurant grills, building heaters, diesel generators, and fireplaces. Additionally, during periods free of snow, ice, and rain, fugitive dust may be generated from the travel of vehicles over the roads and parking lots. Motor vehicle and other combustion exhaust includes CO, NOx, PM, hydrocarbons, air toxics, and greenhouse gases. Diesel generators also emit SO2 due to the sulfur content of the fuel.

Additionally, there are other sources of air pollution in the vicinity of the project which emit air pollutants, on a periodic basis. These sources include road construction projects, residential wood burning, prescribed fire activities, wildfire, and restaurant grills. Natural sources in the area may also emit air pollutants including biogenic emissions from trees (e.g., terpenes), lighting, windblown dust, wildfires, sea salt, and volcanoes.

3.13.3 Effects Analysis/Environmental Consequences

No Action Alternative (Alternative 1)

Under Alternative 1, both the National and State Ambient Air Quality Standards would continue to be met. No changes to current use patterns are expected, so this would not result in any changes to the current air quality situation.

All Action Alternatives (Alternatives 2, 3, 4, 5 and 6)

Under all Action Alternatives, short-term impacts to air quality would occur during construction. Duration of construction activities is unknown but would likely take place over 2 summers. These activities would occur during the summer months once snow has left the construction areas. Impacts include fugitive dust, construction vehicle exhaust, and emissions from slash burning. These impacts would only occur during construction of the proposed project. No exceedence of Federal or State AAQS is expected from the operation of construction vehicles (including exhaust and fugitive dust generation) is expected due to the temporary and intermittent duration of earth moving activities, compounded with the high moisture content of the soils in the project area.

Fugitive dust from motor vehicles is expected to be minimal once the parking lot is built because of the high moisture content associated with the soils and road during the winter, when rain and snow are common during the course of travel to and from the ski area. All action alternatives would increase the number of motor vehicles and bus use for transportation from the new parking facilities at Hood River Meadows Parking Lot (HRM) to the main base area. However, as new cars and buses, replace older vehicles, and the advancements in clean fuels, the emissions from these mobile sources are likely to continue to decrease, even with the increase in the number of vehicles which may use the parking lot during peak visitor use periods.

Historically, carbon monoxide has been the main pollutant associated with increased car or truck emissions, while diesel particulates have been of concern with buses. These emissions are at their highest levels when vehicles are idling or starting up once the engine has cooled off. These effects would be at the highest potential during winter, when these lots are open and at the end of the day as cars that have been sitting are started up. This effect would be localized to the area adjacent to the parking lot and Highway 35.

According to ODEQ Division 254-Regulations for Indirect Sources, an Indirect Source Construction Permit is required for any new parking facilities that have over 1000 parking spaces proposed. As stipulated in OAR 340-254-0040, "Where an Indirect Source is constructed or modified in increments which individually are not subject to review under this rule, and which are not part of a program of construction or modification in planned incremental phases approved by the Director, all such increments commenced after January 1, 1975, shall be added together for determining the applicability of this rule". If this new parking lot meets the criteria, an application would be submitted to the State of Oregon. Compliance with ODEQ requirements would ensure that detrimental effects of this project on air quality would be meet State requirements.

Cumulative Effects for All Action Alternatives

The table below provides a qualitative summary of potential cumulative air effects. It shows past, present and potential future projects, effects from those projects that may result in cumulative effects with Mt. Hood Meadows Parking Lot Improvements EIS, whether these projects overlap in time and space and an assessment if a measureable cumulative effect is expected. Findings of this summary are supported by the analysis above which utilizes pertinent research, PDC and applicable management standards and guidelines.

Overall, there are no detrimental cumulative effects to air quality are expected due to mitigation measures such as limiting the amount of ground disturbance and design criteria that require conformance with State of Oregon standards including acquisition of all necessary air quality permits.

3.13.4 Consistency Determination

Numerous existing plans provide guidance for projects in the form of Standards and Guidelines (S & G). These documents include the Mt. Hood National Forest Land and Resource Plan (Forest Plan), the Northwest Forest Plan (NWFP) Mt. Hood Meadows Ski Area Master Plan and associated supporting documents. The applicable standards and guidelines are: FW-40,41,42,43,44,45,46,and 47

The United States Federal Government has enacted the Clean Air Act in 1963, with major amendments occurring in 1977 (Prevention of Significant Deterioration), 1990 (Title V Operating Permits), and 1999 (Regional Haze Rule). Many other changes have occurred to the Act over time. Each time the Act is modified, or EPA promulgates new rules, States must modify their Statutes and rules to comply with the Federal Regulations. Additionally, States and local governments also develop their own, more stringent rules, periodically.

As outlined in the effects section this project is consistent with applicable law and direction mentioned above. Major highlights include the inclusion of PDC to meet air quality standards and the Clean Air Act.

3.13.5 Incomplete and Unavailable Information

All information needed to perform this analysis is complete and available.

Table 3-77: Cumulative Effects for Air Quality

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?
		Time	Space		
Existing Old Ski Area Projects	Fugitive Dust	No	Yes	No	Projects are completed. No remaining air quality, effects due to mitigation measures and design criteria implementation on the original projects and natural recovery.
	Vehicle Emissions	No	Yes	No	
Highway 35 Betterment Project – Meadows Creek Culvert Replacements	Fugitive Dust	No	Yes	No	It is anticipated that the Meadows Creek Culvert Replacement project is completed by the time the Mt. Hood Meadows Parking Lot Improvements Project is implemented. No remaining fugitive dust or vehicle emissions.
	Vehicle Emissions	No	Yes	No	
Highway 35 Betterment Project – Clark Creek Wetland Enhancement	Fugitive Dust	No	Yes	No	It is anticipated that the Highway 35 Betterment Project would be completed by the time the Mt. Hood Meadows Parking Lot Improvements Project is implemented. No remaining fugitive dust or vehicle emissions.
	Vehicle Emissions	No	Yes	No	
Stadium Lift, Blue Wetland Enhancement and Access Road Culvert Replacement	Fugitive Dust	No	Yes	No	Projects are completed. No remaining fugitive dust or vehicle emissions.
	Vehicle Emissions	No	Yes	No	
Sunrise and Hood River Meadows Parking Lots	Fugitive Dust	No	Yes	No	Projects are completed. No remaining fugitive dust.
	Vehicle Emissions	Yes	Yes	No	There would be an overlap in timing of effects with these facilities and the Mt. Hood Meadows Parking Lot Improvement Project. Vehicle emissions associated with increased parking have the potential to mix with existing vehicle emissions. No detrimental cumulative effects are expected due to compliance with State permits

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3.14 Climate Change

3.14.1 Analysis Assumptions and Methodology

On January 13, 2009, the Washington Office of the Forest Service released guidance to Forest Service units regarding the incorporation of climate change science into project-level NEPA documents. Guidance for project-level NEPA analysis (USDA FS 2009b) identifies two types of climate change effects to be considered: 1) consider the effect of a proposed project on global climate change and 2) consider the effect of climate change on a proposed project.

An important source of current information on climate change is the United Nations Intergovernmental Panel on Climate Change (IPCC). Their reports (2007) provide the authoritative scientific basis for subsequent Forest Service analysis of the phenomenon.

Information specific to the Forest Service can be found in the latest Synthesis and Assessment Product 4.4. The University of Washington Climate Impacts Group (CIG) (http://cses.washington.edu/data/usfs_orwa.shtml) provides a wide range of climate change products and services to PNW stakeholders using a suite of statistically and dynamically downscaled climate projections based on global model simulations from the IPCC Fourth Assessment Report (IPCC AR4). CIG also provides climate projections for Forest Service lands in Oregon and Washington and recently released a report that included a general summary of climate changes anticipated for the Pacific Northwest (Mote and Salathé, 2010).

Agency direction defines the emission of greenhouse gases (GHG) as the direct climate change effect of a project. Further, the interaction of emissions with atmospheric concentrations of GHG such that they impact the climate is defined as the potential indirect climate change effect. Agency direction states, "because greenhouse gases mix readily into the global pool of greenhouse gases; it is not currently possible to ascertain the indirect effects of emissions from single or multiple sources (projects). Also, because the large majority of Forest Service projects are extremely small in the global atmospheric CO2 context, it is not presently possible to conduct quantitative analysis of actual climate change effects based on individual projects" (USDA 2009).

Carbon storage and sequestration rates influence levels of global GHG and thus climate change. Measurement and projection of carbon at local scale can be costly, and standard approaches for calculation have not yet been agreed on (Fahey et al. 2010). More importantly, from a broad ecosystem perspective most projects are likely to have a minor effect on carbon sequestration. Carbon dynamics and disturbance regimes make a landscape scale assessment more useful for examining forest carbon and whether forest carbon policy will increase or decrease carbon stores of forests.

3.14.2 Existing Condition

Climate Projections and Observed Changes

In the Oregon Cascades, most of the annual precipitation falls during the winter months, primarily as snow in the upper elevations. The snow pack provides crucial storage of winter precipitation, effectively transferring water from the relatively wet winter season to the typically dry summers. Snow pack is also important to winter recreation. Climatic variation and change can have ecological, social and economic implications on a basin.

Recent studies document that Mount Hood's glaciers have decreased as much as 61% over the past century (Lillquist and Walker, 2006). Observations over the 20th century indicate that the Pacific Northwest region has become warmer (by 1 to 3°F annual mean) and wetter (by 10% on average) (http://www.usgcrp.gov/usgcrp/Library/nationalassessment/10NW.pdf). Warmer winter temperatures have resulted in snow turning more often to rain in the lower elevations with a large decrease in average April 1 snowpack levels and corresponding decline in spring runoff and stream flows (Mote 2003; Mote et al. 2005). Climate modeling for the Pacific Northwest predicts greater warming over the next century with a future rate of warming of 0.2 to 1.0° F per decade for the Pacific Northwest, relative to the 1970-1999 average temperature (Mote, et al., 2010). By the end of the 21st century, Forest Service lands are projected to lose on average 64% of their historical April 1st snowpack and snowmelt is projected to occur on average approximately one month earlier (Mantua et al. 2011). Projections indicate that by the end of the 21st century the western Cascades will shift to a more rain-dominant character.

Carbon Cycle

Forests play a critical role in storing and sequestering carbon. Under a warming climate scenario, forests are an important resource value in mitigating greenhouse gas emissions (GHG) and climate impacts given their large capacity for carbon uptake and storage. Forests on public lands, including state and national forests, and private lands help mitigate greenhouse gas emissions by taking up carbon dioxide and storing carbon in trees and soil. Nine of the ten National Forests fixing the most carbon per forested acre nationally are found in the Pacific Northwest with the Mt. Hood National Forest ranking sixth in carbon storage (Ingerson and Anderson 2010). National Forests in Oregon and Washington contain an estimated 2.3 billion metric tons of carbon, about five percent of total forest carbon (41.4 billion metric tons) in the US (Source: Forest Inventory Data Online (FIDO) at http://www.fia.fs.fed.us). This capacity to store a tremendous amount of carbon is important in mitigating climate impacts. Under a warming climate scenario, future carbon in the region will likely decrease as the drier ecoregions lose capacity to store carbon, while the wetter westside Cascades will likely see an increased sequestration as the climate becomes warmer. It is expected that the proportions of carbon among ecoregions will not change significantly in the near future (within a 20-year planning horizon).

3.14.3 Effects Analysis/Environmental Consequences

The effects analysis will discuss how climate change might affect the proposed project, the Mt Hood Meadows Ski Permit area, the potential effect of the proposed project on climate change (i.e., contribution to greenhouse gases (GHG), a main source and driver of accelerated climate change), and carbon loss from permanent removal of trees and soil disturbance. The assessment of climate change impacts to the proposed project will be bounded by the ski area permit area and will be primarily based on regional or ecoregional data or projections. The project-level impacts to climate change will be discussed in the global context. The temporal scale is mid-21st century because greater confidence exists in near-term greenhouse gas emission levels, better understanding of population trends, patterns of socio-economic development, and technology use (including energy use) in the next few decades.

The proposed activities of the project include construction and maintenance of the Twilight Parking Lot and access road to serve current use, relocation/construction of maintenance building to the Sunrise Vehicle Maintenance Shop and Nordic trails, and adding a left and right turn lane into the Meadows permit area. It is estimated that there would be 12 to 25 acres of ground disturbance and tree removal, most of which would be converted to paved surfaces.

Climate Change Effects on the Project Area

Ongoing climate change research concluded the observed rate climate change will accelerate, and that GHG are one of the principal causes of global warming patterns. What is not certain is precisely how much warming would occur, how fast it would occur, and how the warming would feedback to the rest of the climate system, including precipitation patterns and storms. Vulnerability to climate change is particularly relevant to these high elevation watersheds with their strong interactions between climate, hydrology, ecosystems, and humans. An increase in warm winters could affect snow conditions necessary for winter sports activities and tourism. Reduced snow packs and rising snow lines could lead to a concentration of winter sport activities, putting further pressure on the sensitive environment of high elevation ecosystems. Earlier snowmelt could mean a shorter ski season. With reduced snow packs, warmer temperatures,

and drier conditions, some forests would become more vulnerable to extensive wildfires or disturbances. Forest vegetation may shift as lower elevation species encroach into the upper elevations over several decades causing an increase in small tree density, stress related mortality, and contraction of the highest elevation plant communities.

As warmer winter temperatures lead to more precipitation falling as rain than snow, socioeconomic impacts would be expected for winter tourism. Widely accepted global climate models indicate 1.5 to 3.2°C warmer mean annual temperatures by 2040 in the Pacific Northwest (Mote et al. 2003). Nolin and Daly (2006) mapped areas in the Pacific Northwest that are potentially at risk of losing winter snowpack. Using a 2°C projected warming, high precipitation areas with average winter temperatures ranging from -2 to 0°C, would convert from predominantly snowfall to predominantly rainfall precipitation regimes. Under this scenario, the majority of Mt. Hood Meadows snowpack lies immediately above a localized "at-risk" snow zone. The lower elevation snow on Mt. Hood's northern, western, and southern slopes, falls into a class that includes 21% of Oregon Cascades snow, which was indicated as "at-risk" for conversion to rainfall (Nolin and Daly 2006). While 51% of all at-risk snow in the Pacific Northwest is in the Oregon Cascades, most ski resorts are at higher elevations or otherwise outside of the at-risk snow class. However, projections showed Mt. Hood Meadows (and most Oregon Cascades ski resorts) could experience considerably more frequent "warm winters." This study projected relative frequency of ski resort temperatures (December to February) that exceed snow melting points (under a 2°C warming scenario applied to a 30-year temperature record (1971–2000)). Refer to the Aquatics and Water Quality Specialist Reports for discussion of hydrologic effects of the proposed project activities.

Overall, while a changing climate is anticipated for the project area, the resulting higher frequency of warmer winters would not affect the proposed construction and maintenance of the Twilight Parking Lot, Sunrise Vehicle Maintenance Shop, access roads, Nordic trails, or turning lanes proposed in this project.

Effect of Proposed Project on Climate Change

Contribution to Greenhouse Gases (GHG)

The construction of the parking lot is to provide for current use and improve public safety. The action alternatives would generate GHG in the construction, maintenance, and snow plowing of the parking lot and possible increase in traffic in the future due to regional growth. The generation of GHG during construction and maintenance of the parking lot would be short term. The generation of GHG during snow plowing of the parking lot would be short durations (approximately two hours each time the parking lot is plowed) during each year that receives a moderate or higher snow fall. In addition, MHM has successfully executed a Transportation Demand Management (TDM) program over the past decade to provide skiers options to travel to the mountain and relieve traffic congestion, such as the Portland Park and Ride shuttle service, bus service, overnight RV parking, and ride share program[6] . The TDM program would help mitigate or entirely offset the generation of GHG due to an increase in traffic that the parking lot may generate. In the global atmospheric CO2 context and based on the expected small generation of GHG over a short time period during construction of the parking lot, this impact would be considered negligible.

6- http://www.skihood.com/Plan-Your-Trip/Transportation-Options?c=129763858598610000

Carbon Storage Loss

It is estimated that 9.4 to 22.0 acres of forested land would be removed. This would represent a carbon loss in storage and sequestration capability and a potential indirect climate change effect. However, relative to a regional perspective and capacity, the proposed activities would have a minor effect on carbon sequestration. The new Nordic trails would be thinned along the edges to encourage huckleberry shrub growth. At the same time, this would enhance tree growth on approximately five acres as more sunlight and soil resources are made available to the remaining trees. Enhancing growth enhances carbon sequestration and resilience capacity of the surrounding stands. As planted and seeded disturbed sites in the project area revegetate, additional atmospheric carbon would rapidly be taken up and stored as carbon biomass.

Given the relatively short-term generation of GHG from the construction, maintenance, and snow plowing of the parking lot, construction of turn lanes, implementation of MHM's measures for reducing vehicle trips to the ski area, the amount of acres impacted by the proposed action alternatives, and the treatments along the Nordic trails, the direct or indirect effect among all action alternatives would be considered negligible. Also, the No Action Alternative would have a negligible or no effect on climate change.

Cumulative Effects

For cumulative effects, all projects listed in the project record were considered. Impacts of actions on climate change are considered at the global scale and over a 40 year period (to mid-century).

Climate Change Effects on the Project Area

Although a higher frequency of warmer winters is expected for the project area, this would not have an effect on the activities proposed for each action alternative. Because there would be no direct or indirect effect of climate change on any of the alternatives, there would be no cumulative effects.

Effect of Proposed Project on Climate Change

The current state of science makes correlating specific emissions with specific impacts difficult to understand. As GHG emissions are integrated across the global atmosphere, it is not possible to determine the cumulative impact on global climate from emissions associated with any number of particular projects. Nor is it expected that such disclosure would provide meaningful effects for project decisions (USDA 2009). Based on Agency guidance and the lack of direct or indirect effects from implementation of the action alternatives, there would be no cumulative effects contributed by this project.

As a result of implementing any of the action alternatives, the generation of GHG during implementation of the project would be relatively minor and short term. Also, the Transportation Demand Management program (see Transportation Report for more information) could help mitigate or eliminate the generation of GHG due to any increase in traffic resulting from the new parking lot. Because the GHG emissions resulting from implementing any of the action alternatives would be negligible, there would be no cumulative effects associated with this project and the projects listed in the project record.

3.14.4 Summary of Effects by Alternative

Under all alternatives, climate change trends would continue at the same rate, variability, and magnitude. There would be no discernible differences between any alternatives on either: 1) the contribution to global GHG; or 2) the effects of warmer winter, changing hydrologic regime, or change in regional carbon biomass balance on the project area. While the extent and severity of future projected impacts are uncertain, model projections give us a range of possible conditions that may result. A clear trend is warming conditions, which would affect those watersheds close to the snow melt temperature threshold – shifting from a snow-dominated to rain-dominated system. This could directly affect the MHM ski area in terms of reduced snow packs, rising snow lines, and adversely affect snow conditions necessary for winter recreation. Indirectly, climate change could cause delayed openings and shorter ski seasons. Pressures on sensitive high elevation ecosystems may also be affected as rising snow lines may concentrate winter sports activities on the mountain.

In terms of the project effects on climate change, all alternatives would have no or a negligible effect on climate change, GHG, or loss of carbon storage. The project proposes to permanently remove from 9.4 to 22 acres of forest trees to construct a parking lot designed to serve current use and improve public safety. The generation of GHG during construction, maintenance, and snow plowing of the parking lot and associated activities would be relatively minor and short term. With the Forest's tremendous capacity to sequester and store carbon, the loss of forest trees under the action alternatives is unlikely to have a measurable effect on climate change.

3.14.5 Incomplete and Unavailable Information

There is some level of uncertainty regarding the predictions for climate change in the Pacific Northwest, as well as uncertainty about the actual intensity of individual project indirect effects on global climate change. That uncertainty increases as projections are made further out in the latter half of the 21st century. While there are trends that indicate possible future scenarios, there is uncertainty about what the capacity of the Forest would be to adapt to the environmental stresses of climate change.

3.15. Other Required Disclosures

3.15.1 Adverse Environmental Effects that Cannot be Avoided

Implementation of any action alternative would cause some adverse environmental effects that cannot be effectively mitigated or avoided. Unavoidable adverse effects often result from managing the land for one resource at the expense of the use or condition of other resources. For this project, the majority of the unavailable adverse effects are associated with removing forested lands and replacing them with parking lots and other paved surfaces with the MHM permit area. Most adverse effects can be reduced, mitigated or avoided by limiting the extent or duration of effects. The application of Forest Plan standards and guidelines, Best Management Practices, PDC, and monitoring are all intended to further limit the extent, severity, and duration of potential effects. Such measures are discussed throughout Chapter 3 and the purpose of this section is to fully disclose these effects. Table 3-78 below summarizes the unavoidable potential adverse effects to the environment associated with the action alternatives considered in this EIS.

3.15.2 Short-term Uses and Maintenance of 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 the 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 present and future generations of Americans (NEPA Sec. 101).

The Forest Plan and Master Plan committed National Forest System Lands within the MHM permit area to long-term use as a ski area. Constructing an additional parking lot and maintenance shop would result in some minor loss of long-term site productivity (see Section 3.12, Vegetation Management). The loss of forested lands varies with each alternative from approximately 11 to 22 acres. This represents less than one percent of the permit area (3,554 acres) and an even smaller percentage of the Hood River Ranger District. This loss of forested lands would result in some detrimental soil conditions (Section 3.3), loss of wildlife habitat (Section 3.7), loss of huckleberry habitat (Section 3.10), disturbance to Riparian Reserves (Section 3.4) and increase in impervious surface (Section 3.4). As discussed in Chapter 3, none of these impacts were found to be significant given the size of the project compared to the overall size of forested lands in the surrounding area.

Constructing an additional parking lot and maintenance shop would result in increased traffic volume (Section 3.2) and vehicle emissions (Section 3.13). The increase in traffic volume and resulting PAOT is within the limits within the Master Plan. The increase in the number of vehicles for each alternative varies from 598 to 915. This results in a total parking capacity for the MHM permit area to between 3,245 to 3,562 vehicles or approximately 8,100 to 8,900 PAOT. The Master Plan analyzed parking for 4,600 vehicles and the design winter capacity established in the Master Plan for lifts, groomed ski trails, and skier service facilities is 13,900 PAOT (page 9). The PDC (Section 2.3), alternative design (left and right turn lanes), and monitoring strategy (Section 2.4) are all intended to minimize the impacts associated with traffic volume as much as possible. Lastly, the increase in vehicle emissions would have no detrimental impacts due to compliance with State and Federal laws.

3.15.3 Irreversible or Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time, such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road. For example, the timber production capability of the area is lost while the area is used as a winter recreation site and administratively withdrawn. The production lost would be irretrievable, but the action would not be irreversible.

Both an additional parking lot and maintenance shop would represent an essentially permanent commitment of the area to an impervious paved surface, removing forested lands within the permit area. Additional development would not be a completely irreversible or irretrievable commitment of resources although from a practical standpoint it is considered as such. Should

the time come that ski area development within the MHM permit area would no longer be desired and is amortized, the various facilities could be dismantled and removed and the areas revegetated or allowed to return to a natural state. However, natural resource values could take hundreds of years to be returned to their pre-development conditions, and some may never be returned.

Irreversible commitments of soil productivity would occur on approximately 11 to 21 acres as a result of soil compaction and displacement associated with excavation and construction activities. Vegetation removed for the parking lot and maintenance shop would be an irretrievable effect for at least the life of the facility. Suitable habitat for northern spotted owl removed would be replaceable only in the very long-term. Some loss of wildlife habitat would also be irretrievable for the life of the ski area. Increased human disturbance could cause some species to permanently avoid the area. The loss of some individuals of species from MHM area may be irreversible until such time as habitat is restored. Fragmentation of habitat would be irretrievable for the life of the ski area. The new parking lot and maintenance shop would be managed and maintained as permanent openings.

Considerable amounts of fossil fuels, labor and highway construction materials such as cement, aggregate, and bituminous material would be expended. Additionally, large amounts of labor and natural resources would be used in the fabrication and preparation of construction materials. These materials would generally not be retrievable. However, they are not in short supply and their use would be short-term and would not have an adverse effect upon continued availability of these resources. Any construction would also require a substantial one-time expenditure of funds, which are not retrievable.

Table 3-78: Adverse Effects that Cannot be Avoided for Alternatives 2-6

Unavoidable Adverse Effect	Reference	Descriptions of Effects	Forest Service Intended Response and Rationale
Forested Lands	Section 3.12	All action alternatives would permanently remove forested land from the permit area. The loss of forested lands varies from 11.4 acres (Alternative 4) to 22.0 acres (Alternative 3).	There would be no considerable change in the forest structure for the plant association within the analysis area. During the tree removal process, all residual trees would be protected from major damage. Residual trees left would have an increase in growth from the canopy openings and reduction in stocking levels.
Detrimental Soil Conditions	Section 3.3	All action alternatives would result in an irretrievable loss of soil resources. Detrimental soil condition was assessed by ensuring the project impacts remain under 15% total for areas outside the footprints of pavement and buildings. The irretrievable loss varies from 16.7 acres (Alternative 4) to 23.9 acres (Alternative 3).	Soils would be fully detrimentally damaged and devoid of organic matter where paved and otherwise developed, once the project is completely implemented.
Suitable Habitat for Northern Spotted Owl	Section 3.7	Each action alternative removes suitable and foraging habitat for spotted owl. Although this owl habitat lacks the structural components that provide for nest sites, the foraging habitat in this home range is considered high quality and is likely providing enough habitat to support spotted owl survival and reproduction.	The combined suitable and foraging habitat is approximately 67 percent in the core area and 51 percent in the home range and would not place the habitat below thresholds for take according to U.S. Fish and Wildlife Service after implementation of the proposed project. Overall, enough habitat would be maintained for survival and reproduction of the northern spotted owl pair located within the project area.
Mule Deer and Elk Habitat	Section 3.7	Each action alternative removes cover and foraging habitat for elk and deer. It would also further fragment the landscape impacting migration routes and connectivity throughout the project area and routes to other key habitat.	The majority of habitat within the permit area is left intact, and there is habitat adjacent to the permit area. Deer and elk habitat is not limited in the permit area or locally on the Hood River Ranger District.
Snags and Down Logs	Section 3.7	Snag and down logs would be reduced in the project area. In the long-term, the removal of trees would prevent further recruitment of snags and down wood in portions of the permit area. As a result, snag and down log associated species would lose habitat.	The number of snags in not measurable at the watershed scale; therefore, there would be no substantive reduction in the percentage of biological potential being provided for species dependent on snags and down wood.
Neotropical Migratory Bird Habitat	Section 3.7	Neotropical migrant species impacted would be limited to forest species such as Nashville warbler, Hermit thrush, and brown creeper. Tree removal for all alternatives would reduce the amount of habitat available within the permit area.	The amount of tree removal for all alternatives would be small when compared to the range of the species and habitat available within the watershed and on the Hood River Ranger District.
Huckleberry Habitat	Section 3.10	Alternatives 2 through 6 would permanently remove from 7 to 13.5 acres of huckleberry plants; however, some huckleberry rejuvenation may occur along the open margins of the parking lots and Nordic trails.	The PDC (Section 2.3) specify that all open disturbed areas would be seeded with native seed, which includes species common to the huckleberry-beargrass plant association. Also, mitigation measures were developed in collaboration with the Confederated Tribes of Warm Springs to minimize impacts to culturally significant plant resources.
Riparian Reserve Disturbance	Section 3.4	All action alternatives would have some disturbance in the Riparian Reserves (varies from 2.7 to 3.8 acres). Disturbance associated with the new Sunrise maintenance shop in Alternative 3 has some risk of increasing water temperature, sediment and chemical contaminants due to the close proximity to a wetland/stream and complete removal of approximately 400 linear feet of riparian vegetation. Alternative 2 has risk of increased sedimentation due to snow removal limitations in the Sunrise Parking Lot footprint posed by the new Sunrise maintenance shop.	These potential effects are anticipated to be localized and would only manifest themselves in the vicinity of the proposed infrastructure.
Impervious Surfaces in Sub-watershed	Section 3.4	The percentage of impervious surfaces increases by 0.9 to 1.5 percent in the Meadows Creek subwatershed, and by 0.1 percent in the Headwaters of the East Fork of Hood River subwatershed.	While all action alternatives propose to increase impervious surfaces, the total is still below levels of concern.
Traffic Volumes	Section 3.2	The added traffic volumes for each alternative may increase the existing transportation safety issues of US 26/OR 35, which are currently labeled as safety corridors.	PDC (Section 2.3), alternative design (left and right turn lanes), and monitoring strategy (Section 2.4) are all intended to minimize the impacts associated with traffic volume as much as possible.
Vehicle Emissions	Section 3.13	All action alternatives would increase the parking capacity within the permit area. The increase in parking capacity would increase by 598 vehicles (Alternative 4) to 915 vehicles (Alterative 3). These additional vehicles would be driving to and from the permit area on peak days.	Vehicle emissions associated with increased parking have the potential to mix with existing vehicle emissions. No detrimental cumulative effects are expected due to compliance with State of Oregon Department of Environmental Quality requirements. According to ODEQ Division 254-Regulations for Indirect Sources, an Indirect Source Construction Permit is required for any new parking facilities that have over 1000 parking spaces proposed.

3.15.4 Effects on Consumers, Civil Rights, Minority Groups, Women and Environmental Justice

Environmental Justice means that, to the greatest extent practicable and permitted by law, all populations are provided the opportunity to comment before decisions are rendered on, are allowed to share in the benefits of, are not excluded from, and are not affected in a disproportionately high and adverse manner, by government programs and activities affecting human health or the environment.

Executive Order #12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, directs Federal agencies to address effects accruing in a disproportionate way to minority and low income populations. One goal of Executive Order 12898 is to provide, to the greatest extent practicable, the opportunity for minority and low-income populations to participate in planning, analysis, and decision-making that affects their health or environment, including identification of program needs and designs. The Executive Order makes clear its provisions apply full to programs involving Native Americans.

Analysis for this proposed action has been conducted CEQ's Environmental Justice - Guidance Under the National Environmental Policy Act. The proposed action, its purpose and need and area of potential effect have been clearly defined. Ongoing consultation with the Confederated Tribes of Warm Springs is ongoing (see Chapter 4). Also, in accordance with Forest Service and BLM policy, contracting procedures would ensure that projects made available to contractors would be advertised and awarded in a manner that give proper consideration to minority and women-owned business groups.

The Proposed Action and alternatives do not appear to have a disproportionately high or adverse effect on minority or low income populations, or Native American Tribes. The Proposed Action and alternatives do not have a disproportionately high and adverse human health effects, high or adverse environmental effects, substantial environmental hazard, or affects to differential patterns of consumption of natural resources. Scoping and other public involvement did not reveal any issues or concerns associated with the principles of Environmental Justice. No PDC to offset or ameliorate adverse effects to these populations have been identified. All interested and affected parties will continue to be involved with the comment and decision making process.

3.15.5 Compliance with Section 504 of the Vocation Rehabilitation Act and the Americans with Disabilities Act (ADA)

The permittee (Mt. Hood Meadows Ski Resort) would be required to comply with all applicable provisions of Section 504 and the ADA. Compliance would be monitored through review of all construction plans and annual Operating Plans.

3.15.6 Treaty Resources and Reserved Indian Rights

No impacts on American Indian social, economic or subsistence rights are anticipated. No impacts are anticipated related to the American Indian Religious Freedom Act. The Confederated Tribes of Warm Springs have historic interests in this area and have been contacted in reference to this Proposed Action and environmental analysis, as discussed in Section 4.2, Tribal Consultation.

3.15.7 Congressional Designated Lands, Inventoried Roadless Area, and Unroaded Areas

There will be no impacts to any Congressional Designated Lands, including designated wilderness areas, potential wilderness or wild and scenic rivers as none exist within the MHM permit area. Also, there will be no impacts to Inventoried Roadless Areas (IRA) as none exist within or near the project area. The project area contains no unroaded as the project area has a well-developed road system maintained for use by MHM and recreationalists.

3.15.8 Prime Farmlands, Rangelands, and Forestlands

None of the alternatives would have an adverse impact to the productivity of farmland, rangeland, or forestland. All alternatives are in keeping with the intent of Secretary of Agriculture Memorandum 1827 for prime farmland. MHM permit area does not contain any prime farmlands or rangelands. Prime forest land does not apply to lands within the National Forest System. Under all alternatives, the National Forest Systems lands would be managed as directed by the Mt. Hood Land and Resource Management Plan (Forest Plan). This project complies with all standards and guidelines set forth in the Forest Plan.

3.15.9 Wetlands and Floodplains

Floodplains are areas within the riparian areas of Class 1, 2, and 3 streams, and vary from only a few feet, to the entire riparian area in width. Wetlands are areas that regularly are saturated by surface or ground water and subsequently are characterized by a prevalence of vegetation that is adapted for life in saturated soil conditions.

Executive Order 11988 – Protection of Floodplains: Due to the steepness of the topography, small stream size and confined nature of streams in this area, floodplain width is fairly limited. The 100-year floodplain on all first order tributaries is estimated to be less than 15 feet wide in general. On East Fork Hood River, the 100-year floodplain is estimated to be generally less than 30 feet wide, while Meadows and Mitchell Creek are about 20 feet wide. The only work proposed to occur in a floodplain area is the left turn lane that crosses Meadows Creek. As stated in Section 3.4, most of this project would be located in a footprint that has already been disturbed and this project includes numerous Best Management Practices (BMP) and PDC aimed at reducing degradation to physical stream channel characteristics. In addition, a new culvert would be installed prior to construction of the left turn lane that is larger in diameter and would allow more natural stream and floodplain processes to occur.

Executive Order 11990 – Protection of Wetlands: The proposed right turn lane included in all alternatives would remove less than an acre of wetlands located immediately adjacent to Highway 35. To mitigate this loss of wetland, a new wetland would be created in approximately the same location relative to the newly constructed right-turn lane. As a result, there would be no net loss in wetlands.in all action alternatives would impact a small wetland immediately adjacent to Highway 35. Sections 3.4, Water Quality and Section 3.5, Aquatics provide a full analysis of the impacts associated with these actions.

As documented in Section 3.4, Water Quality, none of the other proposed activities are located in wetlands. Wetland mapping efforts have been completed by consultants hired by Mt. Hood Meadows as well as Forest Service specialists. All of the action alternatives do propose some level of entry into Riparian Reserves adjacent to wetlands. This is due to site limitations, and the incursions were avoided where possible. PDC and Best Management Practices (BMP) aimed at reducing or eliminating potential detrimental effects to water quality are included with this project. Even with PDC and BMP, there is some risk of degradation to water quality in a wetland adjacent to the Sunrise Maintenance Shop in Alternative 3. This would likely be observed at the site level. All other action alternatives protect water quality to adjacent wetlands.

3.15.10 Potential or Unusual Expenditures of Energy

The No Action alternative would not require any expenditure of fuel or energy. The Proposed Action and all action alternatives would require expenditures of fuel for the use of construction vehicles and for workers to access the project area. There would be an increased use in electrical power needed for heating and lighting additional skier services buildings and the new maintenance/bus shops. Also, there would be an increase of expenditures of fuel for the increase in visitors coming to the ski area, particularly on peak days. Overall, none of the alternatives would result in any unusual expenditure of fuel.

3.15.11 Cumulative Effects

Cumulative effects are addressed in each of the resource areas discussed in Chapter 3. Incremental impacts of the environment from multiple actions over time are assessed for each of the Forest resources.

3.15.12 Conflicts with Plans or Policies of Other Jurisdictions

NEPA at 40 CRF 1502.25(a) directs "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with . . . other environmental review lands and executive orders."

Based on information received during scoping, informal consultation meetings, and analysis in the EIS, none of the alternative under consideration would conflict with the plans or policies of other jurisdictions, including the Confederated Tribes of Warm Springs. This project would not conflict with any other policies and regulations or laws, including the Clean Water Act, Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, National Historic Preservation Act, and Clean Air Act. Refer to the following sections for discussions regarding these laws:

- Section 3.4 Water Quality – Clean Water Acts;
- Section 3.5 Aquatics and 3.7 Wildlife – Endangered Species Act;
- Section 3.5 Aquatics – Magnuson-Stevens Fishery Conservation and Management Act;
- Section 3.10 Cultural Resources – National Historic Preservation Act.
- Section 3.12 Vegetation Management – National Forest Management Act
- Section 3.13 Air Quality – Clean Air Act

Chapter 4 - Consultation and Coordination

4.0. Consultation and Coordination

This chapter provides a list of preparers and agencies consulted during the development of the environmental analysis, as well as a distribution list of the Draft EIS. The project development phase was a collaborative effort involving many individuals representing Federal, State, and local agencies. The following sections will list those involved in the consultation and coordination process of the project. The Interdisciplinary Team member section will name all specialists involved in the preparation process of this EIS and describe the education and experience of each member.

4.1. Federal, State and Local Agencies

The following sections describe the formal and information consultation that was completed with federal and state agencies as part of this project.

4.1.1 Consultation with U.S. Fish and Wildlife Service (FWS)

Formal consultation is required with FWS for disturbance of Northern spotted owls (*Strix occidentalis caurina*) for this project. The effects determination for disturbance for this project is **May Affect, Not Likely to Adversely Affect (NLAA)** northern spotted owls since all construction activities would take place outside the disruption distance for noise. Due to the proximity of the proposed activities to the known spotted owl nest site, the effects to suitable habitat are **May Affect, Likely to Adversely Affect (LAA)** due to the degradation and removal of suitable habitat within the home range and core area for a known northern spotted owl. Even though this owl habitat lacks the structural components that provide for nest sites, the foraging habitat in this home range is considered high quality and is likely providing enough habitat to support spotted owl survival and reproduction. The combined suitable and foraging habitat is approximately 67 percent in the core area and 51 percent in the home range and would not change after implementation of the proposed project. Although the habitat removal would result in a "Likely to Adversely Affect" determination for impacts to spotted owl, there is enough habitat would be maintained for survival and reproduction of this pair.

Formal consultation with FWS was completed as part of the programmatic consultation entitled "Biological Opinion and Conference Opinion Regarding the Effects of Habitat Modification Activities of Northern Spotted Owls (*Strix occidentalis caurina*) and it's Critical Habitat, and Proposed Critical Habitat within the Willamette Province, FY 2013" (FWS Reference Number: 01EOFW00-2012-F-0158).

4.1.2. Consultation with National Marine Fisheries Service (NOAA Fisheries)

Lower Columbia River steelhead (*Oncorhynchus mykiss*) is the only Endangered Species Act listed fish species located within the action area. Lower Columbia River steelhead trout designated spawning and rearing critical habitat in Meadows Creek is unoccupied, but extends up to Highway 35 within the project area. The increased fine sediment expected from the left turn lane construction would not measurably diminish the quality or quantity of spawning and rearing habitat for steelhead trout; therefore, this action would not result in the destruction or adverse modification of steelhead critical habitat. There is no adverse effect to Essential Fish Habitat as it

is not present in the affected environment. Overall, this project has **No Effect** on steelhead trout and **No Adverse Modification** to critical habitat for the species. As such, no consultation with NOAA Fisheries is required for this project.

4.1.3. Consultation with Oregon State Historic Preservation Office (SHPO)

The National Historic Preservation Act and the National Environmental Protection Act both require consideration be given to the potential effect of federal undertakings on historic resources, (including historic and protohistoric cultural resource sites). The guidelines for assessing effects and for consultation are provided in 36 CFR 800. To implement these guidelines, in 2004, Region 6 of the Forest Service entered a Programmatic Agreement (PA) with the Oregon State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (ACHP).

The proposed activities of the MHM project include tree removal, slash burning, utility line installation, grading and construction that involve heavy machinery and ground disturbance. In accordance with the 2004 agreement, heritage resource surveys have been conducted for those ground disturbing activities requiring inspection and documented in Heritage Resource Report 2012/060606/0005 (Dryden 2012). The surveys included all alternatives proposed for this project, and also included additional alternatives eventually dropped from further consideration. Also in accordance with the 2004 agreement, a site evaluation was documented in Heritage Resource Report 2012/060606/0006 (Dryden 2012).

The recommended protective measures would adequately protect the known heritage resources. The site protection measures were developed on the Mt. Hood National Forest to be consistent with the National Historic Preservation Act and adapted for use across the forest. The Oregon State Historic Preservation Officer has concurred that the previous use of these methods would result in no effect to heritage resources. Contracts would contain provisions for the protection of sites found during project activities. Based on the proposed protective measures, the project meets the criteria in the Programmatic Agreement for "Historic Properties Avoided" determination (Stipulation III (B) 2).

4.1.4. Consultation with Oregon Department of Transportation (ODOT)

The Forest Service has coordinated with Oregon Department of Transportation (ODOT) throughout the planning process for this project. ODOT is responsible for the issuing the approach road permit for the left and right turn lanes associated with this project, which includes the completion of a traffic impact analysis. The approach permit is directly tied to the development of the new parking lot and anticipated increase in traffic on Highway 35. Kittleson & Associates, Inc. is a consulting firm hired by Mt. Hood Meadows Ski Resort to complete the traffic impact analysis. The traffic analysis was used by the Forest Service Interdisciplinary Team in the analysis for this project.

ODOT provided formal feedback on the traffic analysis associated with this project via formal written communication on July 1, 2011 and July 24, 2012. In addition, the Forest Service received a formal scoping letter from ODOT dated August 8, 2011. These letters as well as the traffic analysis completed by Kittleson & Associates are available in the project record, located at the

Hood River Ranger District in Mount Hood/Parkdale, Oregon. In addition, the Forest Service and ODOT have had numerous informal discussions on this project including a field trip to review the proposed left-turn lane on July 7, 2011. Many of the discussion have focused on the technical details on the transportation analysis and have taken place between engineers working on this project. Discussions on the transportation component of this project will continue throughout the planning, permitting and implementation phases on this project.

The July 2012 letter provided specific recommendations for changes to the traffic impact analysis and mitigation measures to be considered and incorporated into this DEIS. The five specific recommendations and Forest Service response are summarized in the following table.

Table 4-1: ODOT Recommendations and Forest Service Response

Topic	Specific ODOT Recommendation	Response
Turn Lanes	Require design and construction of improvements on OR 35 [Oregon Highway 35] at the approach road to the Twilight Parking Lot. Improvements would include creation of a northbound left turn lane and southbound right turn lane into the Forest Service road approach [Forest Service Road 3545] as described in the TIA (traffic impact analysis). Construction and operation of the approach require an ODOT highway approach permit.	Both the left and right turn lanes are incorporated as connected actions for all action alternatives as described in Sections 2.3.2, 2.3.3, 2.3.4 and 2.3.5 of this DEIS.
Transportation Demand Management (TDM) Monitoring	Require development of a mechanism for monitoring the effectiveness of TDM measure on traffic levels at key intersections. Identify what will be done if TDM measures do not meet anticipated stated levels. Require continuation of Mt. Hood Meadows annual reporting on traffic operations, parking and TDM programs utilizing quantitative reporting.	Both the Master Plan (Transportation PDC #1, Master Plan ROD page A-16) and the PDC for this project (Section 2.4, Transportation-2) require monitoring of the effectiveness for the TDM. The PDC states: "In cooperation with ODOT, a traffic monitoring program will be maintained at MHM to be able to determine the effectiveness of traffic mitigation measures and the correlation of ski area usage to the total traffic volume." The monitoring requirements are more fully described in Section 2.5.

Topic	Specific ODOT Recommendation	Response
Fiber Optic Extension	For TDM and safety purposes, fund and construction extension of fiber optic cable from US 26 Timberline to the Twilight Parking Lot site approach on OR 35. This cable could be utilized by ODOT, Mt. Hood Meadows, OSP [Oregon State Police] and Hood River Sheriff office for communications and for enhanced Intelligent Transportation Systems (ITS) traveler and safety information. This project would result in improved safety and peak hour congestion management along the US 26-OR 35 highway corridor. It could also be useful for implementing parking management (Variable Message Signs) and other TDM measures.	This recommendation is outside the geographic scope of this project (Mt. Hood Meadows Ski Resort permit area) as established in the Purpose and Need for Action (Section 1.3).
Multimodal Plan Participation	Require Mt. Hood Meadows to participate in the Mt. Hood Multimodal Transportation Plan development, and continue in good faith to cooperate with ODOT and Mt. Hood National Forest to implement improved transit, parking management and transportation demand management programs for the ski area.	Requiring a special use permittee to participate in an inter-agency process is outside the scope of site-specific NEPA.
Transit Service	Require Mt. Hood Meadows to state their proposed role with regard to transit service, including expectation around level of involvement, and what number of trips Mt. Hood Meadows-provided transit is anticipated to accommodate.	A Mass Transit Alternative was an alternative considered, but eliminated from detailed study as part of this DEIS and as described in Section 2.7.4. Although this alternative was eliminated from detailed study, MHM provides transit service to reduce the traffic impacts on Highways 26 and 35 as well as to accommodate the approved people at one time (PAOT). MHM has stated that it will pursue increasing the role of transit to the ski area with the goal of increasing the current number of buses per day providing skier services to the mountain from 20 to 90 by 2015. Bus transportation would be provided, if it is cost-effective.

4.2. Tribal Consultation

Consultation was conducted with the Confederated Tribes of Warm Springs (CTWS) via coordination meetings held between tribal authorities of CTWS and line officers with Forest Service. The Forest Service received a formal scoping letter from CTWS in support of the project dated August 24, 2011. The scoping letter is available in the project record, located at the Hood River Ranger District in Mount Hood/Parkdale, Oregon.

In addition, the Forest Service coordinated with the CTWS at the staff level, primarily between the cultural resource specialists concerning huckleberry plants. On March 12, 2012, members of the Forest Service and CTWS interdisciplinary teams met to discuss specific mitigations measures. The nordic trail design features were adjusted for all action alternatives as described in Sections 2.3.2, 2.3.3, 2.3.4, and 2.3.5 in order to encourage huckleberry production adjacent to the trails. In addition, four Project Design Criteria (Section 2.4) were added to encourage huckleberry production and honor tribal Treaty Rights within the MHM permit area. All of the effects of these mitigation measures were fully analyzed in Chapter 3.

4.3. Preparers and Contributors

The following is a list of contributors to this Draft EIS. Numerous other Forest Service employees contributed to the completion of this document through their assistance in review and support functions, and/or by providing US Forest Service-level data and other information needs. Their help was greatly appreciated and recognized. The members and roles of the interdisciplinary team are listed below and short biographies follow for each person.

Role	Person
IDT Leader / NEPA Specialist	Jennie O'Connor Card / Michelle Lombardo
Recreation / Visual Quality	Dan Gilfillan / McKenzie Jensen
Transportation	Rithy Bein
Soil Scientist	John Dodd
Hydrologist / Air Quality	Mark Kreiter
Fish Biologist	Gary Asbridge
Wildlife Biologist	Stephanie Powers
Wildlife Consultation	Patty Walcott
Botanist / Invasive Species	Susan Nugent
Heritage Resource Specialist	Mike Dryden
Silviculture	Whitney Olsker
Climate Change	Jeanne Rice / Wesley Wong
Ski Area Permit Administrator	Andrew Burrows
GIS	Steve Warila

Gary Asbridge. Fisheries Biologist, US Forest Service, Mt. Hood National Forest, Hood River Ranger District, Mount Hood/Parkdale, Oregon. Education: Bachelor of Science in Biology – Montana State University; Master of Science in Fishery Resources – University of Idaho.

Experience: Interdisciplinary planning team member for a wide range of forest management projects, Mt. Hood National Forest eastside zone fisheries program management, stream and floodplain restoration planning and implementation, and environmental education coordination with the Forest Service since 1990. Mt. Hood National Forest eastside zone vegetation (timber and silviculture) team leader 2010 to 2012.

Rithy Bein. Civil Engineer, US Forest Service, Mt. Hood National Forest, Supervisor's Office, Sandy, Oregon. Education: Bachelor of Science in Civil Engineering – Oregon State University. Experience: Provide engineering support for multiple Interdisciplinary Team planning projects on the Mt. Hood National Forest and Columbia River Gorge National Scenic Area. Contract Administration for the Alternative Transit Opportunities and Transportation Demand Management within the Mt Hood National Forest project. Project management team member for the Mt. Hood Multimodal Transportation Planning effort led by the Oregon Department of Transportation.

Andrew Burrows. Special Use Permit Administrator, US Forest Service, Mt. Hood National Forest, Hood River Ranger District, Mount Hood/Parkdale, Oregon. Education: B.A. Recreation Administration and Outdoor Recreation. Experience: Permit Administration and Outdoor Recreation.

John Dodd. Soil Scientist, US Forest Service, Mt. Hood National Forest, Hood River Ranger District, Mount Hood/Parkdale, Oregon. Education: B.S. in Soil Science, Land Use Emphasis – Oregon State University. Experience: Forest Soils Technical Reporting, Soil and Watershed Restoration and Planning, Ski Area and Forest Vegetation Management with the Forest Service since 1988, and on the Hood River District since 1991.

Mike Dryden. East Zone Archaeologist, US Forest Service, Mt. Hood National Forest, Hood River Ranger District, Mount Hood/Parkdale, Oregon. Education: B.S. in Anthropology – Oregon State University. Experience: 25 years as archaeologist with the US Forest Service, 12 months archaeological excavation.

Dan Gilfillan. Recreation Specialist, US Forest Service, Mt. Hood National Forest, Hood River Ranger District, Mount Hood/Parkdale, Oregon. Education: B.S. in Interdisciplinary Studies Utah State University. Experience: Outdoor Recreation Planning and Visual Resource Management for the Bureau of Land Manage and Forest Service since 2001.

McKenzie Jensen. Recreation Specialist, US Forest Service, Mt Hood National Forest, Zigzag Ranger District, Zigzag, Oregon. Education: B.S. in Earth Sciences Montana State University. Experience: Provide Recreation input for Interdisciplinary Team planning projects since 2005.

Mark Kreiter. Hydrologist, US Forest Service, Columbia River Gorge National Scenic Area and Mt. Hood National Forest, Hood River, Oregon. Education: B.S. and graduate work in Geology, A.A.S. in Water Resources. Experience: Project effects assessments, watershed restoration, wildland fire restoration and monitoring with the USDA Forest Service since 1989.

Michelle Lombardo. Natural Resource Planner, US Forest Service, Mt. Hood National Forest, Sandy, Oregon. Education: B.S. in Natural Science, emphasis in Geology; M.S. in Geography, emphasis in Natural Resource Management. Experience: Forest Plan implementation and NEPA coordination and writing with the Forest Service since 2005.

Susan Nugent. Botanist, US Forest Service, Mt. Hood National Forest, Hood River Ranger District, Mount Hood/Parkdale, Oregon. Experience: Twenty-two years as a botanist for the US Forest Service, 3 years botany research technician for Bureau of Land Management Salem District, and 4 years as an independent botany consultant; Eastside zone Botanist 1992-1996; assistant Acting Forest Botanist 1995-1996 and 2003; assistant to the Region 6 Survey and Manage Species Review Coordinator and assistant to the Acting R6 Botanist 2000-2002; Interdisciplinary Team Leader 2005-2007. Areas of emphasis: Project effect assessments for R6 Sensitive Species and Survey and Manage species; native plant restoration, and noxious weed management.

Jennie O'Connor Card. Natural Resource Planner, US Forest Service, Mt. Hood National Forest, Hood River Ranger District, Mount Hood/Parkdale, Oregon. Education: B.A. in Biological Basis of Behavior and Environmental Studies; Master of Environmental Management, emphasis in Resource Ecology; Master of Forestry, emphasis in Silviculture – Duke University. Experience: Forest Plan implementation, National Environmental Policy Act (NEPA) coordination and writing, Freedom of Information Act (FOIA), and Forest Management with the Forest Service since 2001.

Whitney Olsker. Silviculturist, US Forest Service, Mt. Hood National Forest, Hood River Ranger District, Mount Hood/Parkdale, Oregon. Education: B.S. in Forestry – Northern Arizona University. Experience: Certified Silviculturist since 2011 and forester with the USDA Forest Service since 2003

Stephanie Powers. Fisheries and Wildlife Biologist, US Forest Service, Mt. Hood National Forest, Hood River Ranger District, Mount Hood/Parkdale, Oregon. Education: B.S. in Fisheries and Wildlife Science- Oregon State University. Experience: Provide technical information to managers to assist in making informed decisions, conduct fish and wildlife surveys and carry out monitoring since 2003.

Jeanne Rice. Ecologist, US Forest Service, Mt. Hood National Forest, Sandy, Oregon. Education: B.S. in Forestry and graduate work in Silviculture. Experience: Region 6 Certified Silviculturist with the US Forest Service since 1991, member of the NW Oregon Ecology Group since 2002, and Forest Climate Change Coordinator since 2010. Worked on project planning and landscape assessments, forest sustainability criteria and indicators, and Forest Plan monitoring.

Patty Walcott. Wildlife Biologist, US Forest Service, Mt. Hood National Forest, Hood River Ranger District, Mount Hood/Parkdale, Oregon. Education: B.S. in Wildlife Management - Humboldt State University. Experience: Wildlife surveys for US Forest Service and National Park Service 1989 to 1999. Endangered Species Act implementation with the US Fish and Wildlife Service 1999 to 2007. East-side zoned wildlife biologist with the US Forest Service since 2007.

Steve Warila. Executive Director of Mountain Operations and Planning, Mt Hood Meadows. Mount Hood/Parkdale, Oregon. Education: One year Environmental Studies - B.A. Business Administration – Linfield College. Experience: Mt Hood Meadows since 1975. Duties have included project design utilizing CAD/GIS since 1993

Wesley Wong. Ecologist, USDA Forest Service, Mt. Hood National Forest, Sandy, Oregon. Education: B.S. Environmental Biology and Management, University of California, Davis. M.S. Natural Resources and Environment (Conservation Biology), University of Michigan. Experience:

Forest Climate Change Coordinator since 2012; USDA Forest Service Restoration Biologist since 2007; USDOI BLM Natural Resources Specialist (soils, botany, timber) 2001-2006; member of the NW Oregon Ecology Group since 2012. Project portfolio includes: climate vulnerability assessment, project planning and landscape assessments, non-forested habitats assessment, native plant materials for site revegetation, and Forest climate change coordination.

4.4. Distribution List for Draft EIS

This Draft Environmental Impact Statement will be distributed to individuals and organizations that responded throughout this process, as well as Federal agencies, federally recognized tribes, State and local governments, and key partners. These organizations and agencies are listed below. Also, the mailing list includes approximately 35 individuals that are not listed here. The complete mailing list is maintained in the project record, available at the Hood River Ranger District in Mount Hood/Parkdale, Oregon.

Advisory Council on Historic Preservation
Bark
Cascade Resource Advocacy Group
Confederated Tribes of the Warm Springs
Crag Law Center
David Evans and Associates
Department of Energy
Federal Highway Administration
Friends of Mt. Hood
Hood River County Planning Department
Hood River Valley Residents Committee
Mazamas
Mount Hood National Park Campaign
Mt. Hood Meadows
Mt. Hood Study Group
National Agricultural Library
National Marine Fisheries Service
National Park Service
NOAA Habitat Conservation District
Northwest Environmental Defense Center
Northwest Power Planning Council
Northwest Ski Club Council
Office of Environmental Policy & Compliance
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Oregon Department of Forestry
Oregon Parks & Recreation Department
Oregon Department of Transportation, Region 1
Oregon Nordic Club
Oregon Wild
Pacific Northwest Ski Areas Association
Portland Audubon Society
Portland Snowrider Project
Ski Area Citizens Coalition
Sokol & Associates
Tetra Tech
Timberline Ski Area
USDA Animal and Plant Health Inspection Service
USDA Natural Resource Conservation Service
U.S. Army Corps of Engineers
U.S. Coast Guard
U.S. Environmental Protection Agency, Region 10
U.S. Navy

Appendix A - BMPs

Mt. Hood Meadows Parking Improvements EIS - Best Management Practices for Water Quality Protection

BMP Title [1]	Objective	Explanation	Project Design Criteria (PDC)	Implementation and Responsibility	Ability to Implement	Effectiveness	Monitoring
Plan-2. Project Planning and Analysis	Use the project planning, environmental analysis, and decision making processes to incorporate water quality management BMPs into project design and implementation.	The project planning, environmental analysis, and decision making process is the framework for incorporating water quality management BMPs into project design and implementation. The process should identify likely direct, indirect, or cumulative impacts from the proposed project or management activities on soils, water quality, and riparian resources in the project area. Project documents (plans, contracts, permits, etc.) should include site-specific BMP prescriptions to meet water quality objectives as directed by the environmental analysis. Project planning should ensure that activities are consistent with land management plan direction; State BMPs, floodplain, wetland, coastal zone; and other requirements including Clean Water Act (CWA) 401 certification, CWA 402 permits, and CWA 404 permits; wilderness or wild and scenic river designations; and other Federal, State, and local rules and regulations.	Throughout the planning process and PDC A-4, A-5, A-7 through A-9	Hydrologists, fish biologists, geologists, and/or soil scientists evaluate watershed characteristics and estimate response to proposed activities. The project is designed to include site-specific prescriptions for each area of water quality concern. The subsequent contract would include provisions to meet water quality criteria and other resource protection requirements as provided by this EIS. The Forest Service Permit Administrator or his/her designee would monitor the implementation of the PDCs during construction and operations on regular basis and would have the authority to provide direction and/or take action if construction or operations are not conducted according to the PDC	High	High based on local monitoring and experience	The Forest Service Permit Administrator or his/her designee would monitor the implementation of the PDCs, as described in implementation and responsibility. This project would go into a pool of similar projects to be selected for project level BMP implementation and effectiveness monitoring as per the National BMP Monitoring Protocol. If selected, watershed and recreation specialists would evaluate whether the site-specific BMPs were implemented and the effectiveness of the BMPs. This project would be part of annual, informal monitoring conducted by Forest Service hydrologist and soil scientist to observe BMP effectiveness and make adjustments to correct any observed deficiencies.

1 - Taken from 2012 National Core BMP Technical Guide

BMP Title [1]	Objective	Explanation	Project Design Criteria (PDC)	Implementation and Responsibility	Ability to Implement	Effectiveness	Monitoring
Plan-3. Aquatic Management Zone (AMZ) Planning	To maintain and improve or restore the condition of land around and adjacent to water bodies in the context of the environment in which they are located, recognizing their unique values and importance to water quality while implementing land and resource management activities.	The land around and adjacent to water bodies plays an important ecologic role in maintaining the structure, function, and processes of the aquatic ecosystem. These areas provide shading, soil stabilization, sediment and water filtering, large woody debris recruitment, and habitat for a diversity of plants and animals. The quality and quantity of water resources and aquatic habitats may be adversely affected by ground-disturbing activities that occur on these areas. Protection and improvement of soil, water, and vegetation are to be emphasized while managing these areas under the principles of multiple use and sustained yield. Designation of a zone encompassing these areas around and adjacent to a waterbody is a common BMP to facilitate management emphasizing aquatic and riparian-dependent resources. These management zones are known by several common terms such as streamside management area or zone, riparian management area, stream environment zone, and water influence zone. For purposes of the National Core BMPs, these areas will be referred to as AMZs. Local regulation often stipulates the area and extent of AMZs and may be listed in land management plans; biological opinions, evaluations, or assessments; and other regional or State laws, regulations, and policies.	Throughout the planning process and PDC A-4, A-5, A-14 through A-16	The AMZ requirements are identified by an interdisciplinary team during the environmental analysis. The project is designed to include site-specific BMP prescriptions for the prevention of sedimentation and other stream damage from construction and operations. The Forest Service Permit Administrator or his/her designee would monitor the implementation of the PDCs during construction and operations on regular basis and would have the authority to provide direction and/or take action if construction or operations are not conducted according to the PDC.	High to Moderate	High to Moderate based on literature, local monitoring and experience	Same as previous BMP.
AqEco-2. Operations in Aquatic Ecosystems	Avoid, minimize, or mitigate adverse impacts to water quality when working in aquatic ecosystems.	Common construction or maintenance operations in water bodies often involve ground disturbance. The close proximity to, and contact with, the water body increases the potential for introducing sediment and other pollutants that can affect water quality. This BMP includes practices for minimizing direct and indirect water quality impacts when working in or adjacent to water bodies.	PDC C-1 through C-6, C-8, C-9, A-1 through A-5, A-9 through A-12	The project is designed to include site-specific prescriptions for each area of water quality concern. The subsequent contract would include provisions to meet water quality criteria and other resource protection requirements as provided by this EIS. The Forest Service Permit Administrator or his/her designee would monitor the implementation of the PDCs during construction and operations on regular basis and would have the authority to provide direction and/or take action if construction or operations are not conducted according to the PDC.	High to Moderate	High to Moderate based on literature, local monitoring and experience	Same as previous BMP.

BMP Title [1]	Objective	Explanation	Project Design Criteria (PDC)	Implementation and Responsibility	Ability to Implement	Effectiveness	Monitoring
AqEco-3. Ponds and Wetlands	Design and implement pond and wetlands projects in a manner that increases the potential for success in meeting project objectives and avoids, minimizes, or mitigates adverse effects to soil, water quality, and riparian resources.	Ponds and wetlands are developed for a variety of reasons including recreation, water sources, stock ponds, gravel extraction, wetland mitigation, and wildlife improvement. The excavation of material and construction of berms, dikes, dams, channels, wildlife water sources, and waterfowl nesting islands have the potential to introduce sediment and other pollutants into adjacent waterbodies, alter flows, and cause physical damage to the ponds and adjacent stream channels both during and after construction. Constructing the projects to withstand potential overflow and flooding is a primary consideration during project planning and design.	PDC C-1 through C-6, C-8 through C-13, A-1 through A-5, A-9 through A-12, A-17	The project is designed to include site-specific prescriptions for each area of water quality concern. The subsequent contract would include provisions to meet water quality criteria and other resource protection requirements as provided by this EIS. The Forest Service Permit Administrator or his/her designee would monitor the implementation of the PDCs during construction and operations on regular basis and would have the authority to provide direction and/or take action if construction or operations are not conducted according to the PDC.	High to Moderate	High to Moderate based on literature, local monitoring and experience	Same as previous BMP.
Rec-2. Developed Recreation Sites	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources at developed recreation sites by maintaining desired levels of ground cover, limiting soil compaction, and minimizing pollutants entering water bodies.	Developed recreation sites provide amenities for user comfort and can be located in motorized or non-motorized settings. Often times these areas concentrate high volumes of use into relatively small areas and may be located on or near water bodies, thereby increasing the potential for water quality degradation. Potential pollutants generated by use at developed recreation sites include, but are not limited to, human and animal waste; solid wastes (trash); petroleum products; and other hazardous substances. In addition, continuous or recurring use at one site can cause excessive soil compaction; damage to vegetation, wetlands, and riparian areas; and erosion and sediment transport from the site.	PDC C-1 through C-6, C-10 through C-13, A-16	The Forest Service Permit Administrator or his/her designee would monitor the implementation of the PDCs during construction and operations on a regular basis and would have the authority to provide direction and/or take action if construction or operations are not conducted according to the PDC.	High	High based on literature, local monitoring and experience	Same as previous BMP.

BMP Title [1]	Objective	Explanation	Project Design Criteria (PDC)	Implementation and Responsibility	Ability to Implement	Effectiveness	Monitoring
Rec-4. Motorized and Non-motorized Trails	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling soil erosion, erosion of trail surface materials, and water quality problems originating from construction, maintenance, and use of motorized and non-motorized trails.	Trail construction, maintenance, and use by motorized vehicles and human or stock traffic can adversely affect water quality by increased sediment delivery and contamination from vehicle fluids and human and animal wastes to nearby water bodies. Compaction of the trail surface limits water infiltration, which can lead to concentrated runoff on the trail surface. Concentrated runoff on trails lacking adequate drainage causes erosion of the trail surface and can transport sediment and other pollutants directly into water bodies if not filtered. Heavy tread, foot, or hoof traffic can loosen some trail surface materials, making them more susceptible to erosion.	PDC A-7	Hydrologists, geologists, and soil scientists evaluate watershed characteristics and estimate response to proposed activities. These professionals would assist in layout of trails in complex areas. The Forest Service Permit Administrator or his/her designee would monitor the implementation of the PDCs during construction and operations on a regular basis and would have the authority to provide direction and/or take action if construction or operations are not conducted according to the PDC.	High	High based on local monitoring and experience	Same as previous BMP.
Rec-10. Ski Runs and Lifts	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during the construction, operation, and maintenance of ski runs and lifts.	A ski area and its operation are complex and can result in a variety of adverse effects to soil, water quality, and riparian resources. These adverse effects can be particularly true for ski runs and lifts. Because good ski runs tend to be steep, extra precautions are needed to avoid or minimize accelerated erosion and resulting sedimentation. Ski run clearing, slope grading, and developing access routes, ski lift and towline facilities, and similar actions can expose and compact soils, resulting in accelerated runoff and erosion. Increased runoff can alter water yield and runoff regimes, augment peak flows, and increase instream sediment from channel erosion. Appropriate soil and water protection measures should be included in the ski area's operation and maintenance plan.	PDC A-7	Hydrologists, geologists, and soil scientists evaluate watershed characteristics and estimate response to proposed activities. These professionals would assist in layout of trails in complex areas. The Forest Service Permit Administrator or his/her designee would monitor the implementation of the PDCs during construction and operations on a regular basis and would have the authority to provide direction and/or take action if construction or operations are not conducted according to the PDC.	High	High based on local monitoring and experience	Same as previous BMP.

BMP Title [1]	Objective	Explanation	Project Design Criteria (PDC)	Implementation and Responsibility	Ability to Implement	Effectiveness	Monitoring
Rec-12. Ski Area Facilities	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources originating from design, construction, operation, and maintenance of ski area facilities.	Ski area facilities include buildings, sanitary facilities, parking lots, and other infrastructure. During construction and operation of facility sites, land may be cleared of existing vegetation and ground cover, exposing mineral soil that may be more easily eroded by water, wind, and gravity. Changes in land use and impervious surfaces can alter temporarily or permanently storm water runoff that, if left uncontrolled, can affect morphology, stability, and quality of nearby streams and other water bodies. Receiving waters can be contaminated by oil, grease, anti-freeze, sewage, trash, sediment, and salt. Construction and operation of these facilities should include measures that will avoid, minimize, or mitigate effects to water quality.	PDC C-10 through C-13, A-12, A-13, A-15, A16	The project is designed to include site-specific prescriptions for each area of water quality concern. The subsequent contract and/or annual operating plan would include provisions to meet water quality criteria and other resource protection requirements as provided by this EIS. The Forest Service Permit Administrator or his/her designee would monitor the implementation of the PDCs during construction and operations on regular basis and would have the authority to provide direction and/or take action if construction or operations are not conducted according to the PDC.	High to Moderate	High to Moderate based on literature, local monitoring and experience	Same as previous BMP.
Road-7. Stream Crossings	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when constructing, reconstructing, or maintaining temporary and permanent water body crossings.	Crossings should be designed and installed to provide for flow of water, bedload, and large woody debris, desired aquatic organism passage, and to minimize disturbance to the surface and shallow groundwater resources. Construction, reconstruction, and maintenance of a crossing usually requires heavy equipment to be in and near streams, lakes, and other aquatic habitats to install or remove culverts, fords, and bridges, and their associated fills, abutments, piles, and cribbing. Such disturbance near the water body can increase the potential for accelerated erosion and sedimentation by altering flow paths and destabilizing stream banks or shorelines, removing vegetation and ground cover, and exposing or compacting the soil. Use of heavy equipment has a potential for contaminating the surface water from vehicle fluids or introducing aquatic nuisance species.	PDC A-12	Hydrologists, geologists, and soil scientists evaluate watershed characteristics and estimate response to proposed activities. These professionals would assist in layout of any stream crossings in complex areas. The Forest Service Permit Administrator or his/her designee would monitor the implementation of the PDCs during construction and operations on regular basis and would have the authority to provide direction and/or take action if construction or operations are not conducted according to the PDC.	Moderate	High based on literature, local monitoring and experience	Same as previous BMP.

BMP Title [1]	Objective	Explanation	Project Design Criteria (PDC)	Implementation and Responsibility	Ability to Implement	Effectiveness	Monitoring
Road-8. Snow Removal and Storage	Avoid or minimize erosion, sedimentation, and chemical pollution that may result from snow removal and storage activities.	Snow removal from roads and parking areas may adversely affect water quality and riparian resources in several ways. Plowing may physically displace native or engineered surfaces on roads, damage drainage structures, or alter drainage patterns. Plowing may also remove protective soil cover (e.g., vegetation or mulch). These changes can result in concentrated flow, increased erosion, and greater risk of sediment delivery to water bodies. Snow piled in large mounds or berms, or in sensitive areas, may contribute to increased run-off, hill slope erosion, mass slope instability, and in-channel erosion from snowmelt. Snow stored in riparian areas and floodplains may compact soils, break or stunt vegetation, or channel runoff in undesirable patterns, thereby weakening the buffering capacity of these areas. Additionally, both snow removal and storage may result in additions of salts or fine aggregates used for de-icing or traction control and other vehicle pollutants directly to surface water and indirectly to both surface water and groundwater during runoff.	PDC A-15	The Forest Service Permit Administrator or his/her designee would monitor the implementation of the PDCs during construction and operations on regular basis and would have the authority to provide direction and/or take action if construction or operations are not conducted according to the PDC.	High	Moderate based on literature, local monitoring and experience	Same as previous BMP.
Road-9. Parking and Staging Areas	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when constructing and maintaining parking and staging areas.	Parking and staging areas on NFS lands may be permanent or temporary and are associated with a variety of uses including administrative buildings, developed recreation sites, trailheads, and forest management projects. These parking facilities sometimes constitute large areas with little or no infiltration capacity. Runoff from these areas can create rills or gullies and carry sediment, nutrients, and other pollutants to nearby surface waters.	PDC C-1, C-3 through C-6, C-8, A-1 through A-4, A-10, A-11, A-14 through A-16	Hydrologists, geologists, and soil scientists evaluate watershed characteristics and estimate response to proposed activities. These professionals would assist in layout of project elements in complex areas. The Forest Service Permit Administrator or his/her designee would monitor the implementation of the PDCs during construction and operations on regular basis and would have the authority to provide direction and/or take action if construction or operations are not conducted according to the PDC.	High	High to Moderate based on literature, local monitoring and experience	Same as previous BMP.

BMP Title [1]	Objective	Explanation	Project Design Criteria (PDC)	Implementation and Responsibility	Ability to Implement	Effectiveness	Monitoring
Road-10. Equipment Refueling and Servicing	Avoid or minimize adverse effects to soil, water quality, and riparian resources from fuels, lubricants, cleaners, and other harmful materials discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resources during equipment refueling and servicing activities.	Many activities require the use and maintenance of petroleum-powered equipment in the field. For example, mechanical vegetation management activities may employ equipment that uses or contains gasoline, diesel, oil, grease, hydraulic fluids, antifreeze, coolants, cleaning agents, and pesticides. These petroleum and chemical products may pose a risk to contaminating soils, surface water, and groundwater during refueling and servicing the equipment. BMP Fac-6 (Hazardous Materials) provides additional guidance for handling hazardous materials.	PDC C-10 through C-13, A-16	The Forest Service Permit Administrator or his/her designee would monitor the implementation of the PDCs during construction and operations on regular basis and would have the authority to provide direction and/or take action if construction or operations are not conducted according to the PDC.	High	High based on literature, local monitoring and experience	Same as previous BMP.
Veg-6. Landings	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from the construction and use of log landings.	Log landings, in general, are the site of intense activity, serving as the endpoint of yarding operations, the setup location of large equipment (such as skyline yarders), loading areas for log trucks, and fueling and maintenance locations for heavy equipment. To accommodate all this activity, landings tend to be large, and their soils generally become compacted, rutted, and disturbed much more than the rest of the project area. Thus, landings have a high probability of being a source of concentrated overland flow containing sediment and other pollutants.	PDC A-6	The Forest Service Permit Administrator or his/her designee would monitor the implementation of the PDCs during construction and operations on regular basis and would have the authority to provide direction and/or take action if construction or operations are not conducted according to the PDC.	High	High based on literature, local monitoring and experience	Same as previous BMP.

Mt. Hood Land and Resource Management Plan (Forest Plan) Direction

Appendix H of the Forest Plan defines the criteria for Rating "Ability to Implement" and BMPs "Effectiveness" on page H-6. These estimates are general, given the range of conditions throughout the Forest. More specific estimates are made at the project level when the specific BMPs are developed.

Ability to implement

Provides a qualitative estimate of the ability of the Forest Service to implement the BMPs. The following index is used to rate the ability to implement as High, Moderate or Low:

- **High:** Almost certain the BMPs can be implemented as planned.
- **Moderate**: Greater than 75% certainty the BMPs can be implemented as planned.
- **Low**: Less than 75% certainty the BMPs can be implemented as planned.

Effectiveness

Provides a qualitative assessment of the expected effectiveness that the applied measure would have on preventing or reducing impacts on water quality and beneficial uses. The effectiveness of each BMPs would be evaluated with an index that rates the effectiveness of each BMPs as either High, Moderate, or Low.

- **High**: Practice is highly effective (90%) and one or more of the following types of documentation are available:
  - Literature/Research - must be applicable to area.
  - Administrative studies-local or within similar ecosystem.
  - Experience- judgment of an expert by education and/or experience.
  - Fact-obvious by reasoned (logical) response.
- **Moderate**: Documentation shows that the practice is effective less than 90% of the time, but at least 75% of the time; or logic indicates that this practice is highly effective, but there is little or no documentation to back it up.
- **Low:** Effectiveness unknown or unverified, and there is little or no documentation; or applied logic is uncertain in this case, or the practice is estimated to be less than 75% effective.

Effectiveness of BMPs are based on guidance from the National Best Management Practices for Water Quality Management on National Forest System Lands, Volume 1: National Core BMP Technical Guide (USDA, 2012), models, literature, research, 25 years of planning and monitoring implementation of projects on National Forest Lands in the Northwest, 12 years of planning and monitoring implementation of projects at the Mt. Hood Meadows Ski Area and other professional experience.

Models:

- Water Erosion Prediction Project (WEPP) (USDA Forest Service, 1999).

Other Applicable BMP Software:

- Erosion Draw 4.0 (Erosion Control Standards and Construction Drawings – Salix Applied Earthcare, 2002)

Relevant research includes:

- Effectiveness Of Timber Harvest Practices For Controlling Sediment Related Water Quality Impacts (Rashin et. al. 2006).
- Sediment Trapping by Streamside Management Zones of Various Widths after Forest Harvest and Site Preparation (Lakel and others, 2010).
- Reduction of soil erosion on forest roads (Burroughs and King, 1989).
- Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act (Environmental Protection Agency, 2009)

Monitoring Includes:

- Administrative BMP Monitoring Studies, Mt. Hood National Forest: Various administrative monitoring studies were planned and implemented from 1997 through 2004. Monitoring for BMP implementation and effectiveness was performed on a wide variety of BMPs, ranging from riparian reserve protection to temporary road construction. Monitoring results are summarized in the Forest Plan Monitoring and Evaluation Reports for Fiscal Years 1997 through 2004. BMP monitoring completed during this period indicates that overall the BMPs monitored were prescribed and implemented as planned, resulting in adequate soil and water protection in most instances.
- Best Management Practices Evaluation Program (BMPEP), 1992-2002 Monitoring Results (Draft Report). USDA Forest Service, Pacific Southwest Region, Pacific Southwest Region. This draft report summarizes the results of the USDA Forest Service, Pacific Southwest Region, Best Management Practices Evaluation Program (BMPEP), from 1992 to 2002. Past monitoring completed as part of the BMPEP program has validated the effectiveness of BMPs in mitigating the effects of forest management activities on water quality.
- Monitoring done during the Mount Hood National Forest administrative studies cited generally correlates well with the extensive monitoring done during the BMPEP monitoring program in the Pacific Southwest Region.

Professional Experience

- A small group of local professionals further refined assignments of "Ability to Implement" and "Effectiveness" ratings for Mt. Hood Meadows Parking Improvements EIS PDC and BMP based on experience. This group consisted of a Soil Scientist with over 25 years of professional experience in planning, monitoring and implementation of a variety of Forest Service projects in the Pacific Northwest, a Fisheries Biologist with over 23 years of professional experience in planning, monitoring and implementation of a variety of Forest Ser-

vice projects in the Pacific Northwest and a Hydrologist with over 25 years of professional experience in planning, monitoring and implementation of a variety of Forest Service projects in the Pacific Northwest.

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Index

Index

A

Access Roads 1-5, 1-20, 2-4, 2-6, 2-7, 3-13, 2-13, 2-18, 2-23, 3-24, 2-27, 2-34, 2-38, 2-39, 2-48, 2-8, 3-15, 3-18, 2-18, 3-21, 3-27, 3-34, 3-36, 3-43, 3-47, 3-53, 3-127, 3-151, 3-157, 3-174, 3-175, 3-182, 3-197, 3-224

B

Best Management Practices (BMPs); BMPs 1-8, 2-34, 2-35, 3-54, 3-59, 3-65, 3-89, 3-93, 3-216, 3-226, 3-231, A-3, A-10, A-11, A-12, R-11

C

Confederated Tribes of Warm Springs 1-17, 1-20, 2-33, 2-35, 3-195, 3-198, 3-229, 3-230, 3-232, 4-7

Cumulative Effects 3-3, 3-21, 3-24, 3-25, 3-41, 3-56, 3-71, 3-72, 3-76, 3-77, 3-78, 3-80, 3-84, 3-88, 3-116, 3-123, 3-126, 3-129, 3-143, 3-150, 3-152, 3-154, 3-155, 3-156, 3-158, 3-160, 3-161, 3-163, 3-165, 3-166, 3-183, 3-194, 3-199, 3-209, 3-215, 3-220, 3-221, 3-225, 3-232

D

Design Criteria. *See* Project Design Criteria

Desired Future Condition 1-8, 1-10, 1-11, 1-18, 2-46

E

Environmental Justice 3-230

Executive Order 1-10, 3-90, 3-194, 3-230, 3-231

F

Forest Plan 1-3, 1-4, 1-7, 1-9, 1-10, 1-11, 1-16, 1-18, 1-20, 2-3, 2-7, 2-24, 3-26, 2-26, 2-31, 2-34, 2-35, 3-42, 4-8, A-10, 3-45, 3-46, 3-48, 3-52, 3-55, 3-56, 3-58, 3-60, 3-61, 3-65, 3-69, 3-73, 3-75, 3-78, 3-79, 3-81, 3-83, 3-85, 3-87, 3-89, 3-97, 3-129, 3-132, 3-137, 3-142, 3-144, 3-147, 3-162, 3-164, 3-165, 3-167, 3-169, 3-178, 3-180, 3-181, 3-184, 3-185, 3-186, 3-200, 3-201, 3-204, 3-211, 3-213, 3-215, 3-220, 3-226, 3-227, 3-231, A-11, A-7, A-8, R-4, R-5, R-7, 2-8, 2-19

H

Highway 35 1-4, 1-12, 3-4, 2-4, 2-5, 2-6, 2-13, 2-24, 2-29, 2-31, 2-40, 2-43, 2-44, 2-47, 3-7, 3-8, 3-10, 3-14, 3-25, 3-41, 3-45, 3-58, 3-59, 3-64, 3-65, 3-67, 3-70, 3-72, 3-73, 3-75, 3-80, 3-83, 3-87, 3-90, 3-95, 3-97, 3-98, 3-101, 3-105, 3-106, 3-108, 3-111, 3-113, 3-116, 3-117, 3-118, 3-120, 3-129, 3-131, 3-134, 3-141, 3-145, 3-152, 3-160, 3-174, 3-175, 3-177, 3-183, 3-192, 3-194, 3-197, 3-200, 3-201, 3-203, 3-204, 3-208, 3-209, 3-212, 3-220, 3-221, 3-231, 2-8, 2-18

Highway 35 Betterment Project 2-43, 2-44, 3-58, 3-67, 3-72, 3-117, 3-118, 3-203, 3-221

Huckleberry Habitat 1-20, 3-196, 3-197, 3-199, 3-227, 3-229

I

Issues 1-3, 1-9, 1-17, 2-3, 2-36, 2-43, 2-44, 2-47, 3-12, 3-27, 3-31, 3-45, 3-229, 3-230

L

Land and Resource Management Plan. *See* Forest Plan

Land Use Allocations 1-11

M

Management Indicator Species 3-92, 3-144

Mass Transit 2-46, 2-47, 3-7, 3-9, 3-10

Master Plan 1-3, 1-4, 1-7, 1-8, 1-11, 1-16, 1-18, 1-20, 2-3, 2-4, 3-6, 2-6, 2-13, 2-14, 2-24, 2-26, 2-34, 2-35, 2-36, 2-38, 2-41, 2-46, 2-47, 3-7, 3-8, 3-9, 3-10, 3-12, 3-13, 3-15, 3-17, 3-18, 3-20, 3-21, 3-24, 3-26, 3-27, 3-39, 3-43, 3-56, 3-89, 3-125, 3-132, 3-154, 3-167, 3-174, 3-179, 3-184, 3-185, 3-201, 3-203, 3-211, 3-215, 3-220, 3-227, 2-18, 2-8

Master Plan Consistency 1-16, 1-18, 2-3, 2-6, 2-7, 2-8, 2-13, 2-18, 2-24

N

Nordic Guest Service Building 3-36, 3-94

Nordic Ski Trails 2-40, 3-66, 3-156, 3-162

Northern Spotted Owl 3-135, 3-137, 3-150

Northwest Forest Plan 1-7, 1-9, 1-11, 1-20, 2-26, 3-60, 3-61, 3-65, 3-89, 3-132, 3-142, 3-167, 3-169, 3-178, 3-180, 3-181, 3-184, 3-185, 3-186, 3-213, 3-215, 3-220, R-4, R-5, R-7, R-9

O

Oregon Department of Transportation (ODOT) 1-11, 2-4, 2-32, 2-35, 3-4, 3-177, 4-4

P

People At One Time (PAOT) 1-4, 3-6
Preparers 1-3, 4-3
Project Design Criteria 1-16, 1-20, 2-26, 3-14, 3-20, 3-55, 3-59, 3-65, 3-93, 3-193, 3-197, 3-201, 3-216, 4-7, A-3
Proposed Action 1-3, 1-10, 1-11, 1-13, 1-16, 1-17, 1-19, 2-1, 2-3, 2-4, 2-6, 2-37, 2-38, 2-43, 3-10, 3-12, 3-13, 3-32, 3-37, 3-39, 3-54, 3-55, 3-57, 3-65, 3-96, 3-107, 3-138, 3-151, 3-152, 3-154, 3-160, 3-184, 3-197, 3-198, 3-199, 3-214, 3-230, 3-232
Public Involvement 1-19, 2-4, 2-22, 3-230

R

Recreation Opportunity Spectrum (ROS) 3-5, 3-9, 3-10, 3-14, 3-16, 3-18, 3-22, 3-28

S

Sahalie Falls Trail 2-6, 3-8, 2-8, 2-13, 2-17, 2-22, 2-23, 2-37, 2-40, 2-18, 3-18, 3-21, 3-27, 3-58, 3-130, 3-151, 3-153, 3-155, 3-157, 3-168, 3-198, 3-207
Sunrise Maintenance Shop 1-7, 1-11, 1-16, 2-4, 2-6, 3-10, 2-13, 2-24, 2-31, 2-36, 2-37, 2-38, 2-41, 2-19, 3-28, 3-47, 3-49, 3-155, 3-156, 3-162, 3-173, 3-175, 3-176, 3-177, 3-232
Survey and Manage 1-7, 3-99, 3-106, 3-132, 3-135, 3-136, 3-142, 3-161, 3-167, 3-169, 3-171, 3-172, 3-173, 3-174, 3-175, 3-182, 3-184, 3-185, 3-186, 3-213, 3-215, 4-9, R-4, R-9

T

Turn Lanes 1-12, 2-5, 2-7, 3-10, 2-13, 2-23, 2-35, 2-40, 3-48, 3-58, 3-64, 3-65, 3-73, 3-79, 3-82, 3-86, 3-94, 3-107, 3-108, 3-110, 3-116, 3-118, 3-120, 3-121, 3-125, 3-127, 3-128, 3-129, 3-151, 3-157, 3-167, 3-181, 3-204, 3-207, 3-210, 3-212, 3-225, 3-227, 3-229, 2-18
Twilight Parking Lot 1-11, 1-14, 1-16, 2-4, 2-6, 2-7, 2-10, 2-13, 2-15, 2-17, 3-18, 2-21, 2-23, 2-27, 3-28, 2-31, 2-36, 2-38, 2-41, 2-45, 2-47, 4-5, 4-6, 3-30, 3-36, 3-37, 3-40, 3-43, 3-45, 3-47, 3-53, 3-54, 3-55, 3-56, 3-57, 3-62, 3-65, 3-67, 3-73, 3-75, 3-79, 3-82, 3-83, 3-86, 3-93, 3-94, 3-109, 3-115, 3-121, 3-125, 3-127, 3-128, 3-130, 3-151, 3-153, 3-154, 3-156, 3-159, 3-162, 3-167, 3-173, 3-175, 3-177, 3-199, 3-205, 3-206, 3-208, 3-213, 3-223, 3-224, 2-8, 2-18
Twilight Parking Lot Equipment Maintenance Yard (Bus Shop); bus shop 1-12, 1-16, 2-5, 2-7, 2-18, 2-23, 2-38, 2-40, 3-19, 3-65, 3-67, 3-75, 3-82, 3-83, 3-94

U

Utility Lines 1-12, 2-6, 2-7, 3-13, 2-13, 3-18, 2-23, 2-39, 2-8, 2-18, 3-21, 3-27, 3-47, 3-48, 3-67, 3-94, 3-95, 3-96, 3-110, 3-130, 3-155, 3-175

W

Wetland Relocation 2-6, 2-7, 2-13, 2-23, 3-36, 2-37, 2-40, 2-18, 3-53, 3-57
Wetland Restoration 3-25, 3-26, 3-41, 3-161, 3-210