

Appendix A: Mitigation Measures Common to All Action Alternatives

Resource Area	Mitigation
General Considerations	The Spruce Railroad #1 is eligible to the National Register of Historic. Before the beginning of construction, all known contributing features of the historic railroad will be identified and construction methodology will follow the Cultural Resources Treatment Plan. Construction limits would be surveyed and staked and may be marked with construction fencing, tape, flagging, snow fencing, or some similar material, as necessary. The construction limits identify and limit the area of construction activity. The contractor is responsible for ensuring that all work stays inside the construction limits. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone. Area staff would be notified when the project start date is known. Best management practices for drainage and sediment control would be implemented to prevent or reduce nonpoint pollution and minimize soil loss and sedimentation in drainage areas. A stormwater pollution prevention plan would be developed and implemented. Construction vehicle engines would not be allowed to idle for extended periods of time. All construction debris would be hauled from the Park to an appropriate disposal location. All tools, equipment, surplus materials, and rubbish would be removed from the project site upon project completion.
Vegetation	Sediment control measures would be implemented to avoid potential impact to water quality from construction activities. A revegetation plan would be developed to restore disturbed areas along the trail, any former trail segments, parking lot parameters, and construction access areas. Native species would be used in all revegetation. To maximize vegetation restoration efforts, the following measures would be implemented: • Salvage topsoil and incidental native vegetation (as feasible) from construction areas for reuse during restoration. • Monitor revegetation success and exotic plants for up to 3 years following construction, implementing remedial and control measures as needed. Temporary barriers would be provided to protect existing trees, plants, and root zones. Trees or other plants would not be removed, injured, or destroyed without prior approval from the park botanist. In an effort to avoid introduction of non-native / noxious plant species, no imported hay/straw bales would be used during construction or revegetation. On a case-by case

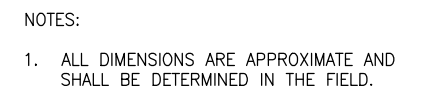
	basis, the following materials may be used for erosion control: pole peelings, wood straw, or other certified weed-free mulch products preapproved by Olympic National Park's chief botanist. All construction vehicles will be pressured washed prior to entering the park for the first time; subsequent entries will not require pressure washing unless the vehicle shows signs of mud, plant material, or other substances that could harbor seeds or other parts of exotic plants. All tools and clothing will be free of seeds or other parts of exotic plants before being used at the construction site. All haul trucks bringing fill materials from outside the Park will be covered to prevent seed transport. (This may or may not be necessary depending on the timing of construction.) All fill, rock, and additional topsoil would be obtained from the project area, if possible. If not possible or if weeds are known to exist in the project area, then weed-free fill, rock, or additional topsoil would be obtained from sources outside the park. NPS personnel would certify that the source is weed-free. Areas which are disturbed by project activities will be revegetated using site-adapted native seed and/or plants.
Water Quality and Soils	Use best management erosion-control practices for drainage and sediment control to prevent or reduce nonpoint source pollution and minimize soil loss and sedimentation in the lake and drainage areas. These practices may include but are not limited to, silt fencing, filter fabric, temporary sediment ponds, check dams of pea gravel-filled burlap bags or other material, and/or immediate mulching of exposed areas to minimize sedimentation and turbidity impacts as a result of construction activities. Silt fencing fabric would be inspected daily during project work and weekly after project completion, until removed. Accumulated sediments would be removed when the fabric is estimated to be approximately 75% full. Silt removal would be accomplished in such a way as to avoid introduction into the lake and any flowing water bodies. If weather conditions during project operations generate and transport sediment to the lake or stream channels, operations would cease until weather conditions improve. The operation of ground-disturbing equipment during large precipitation events would increase the production of sediment that may be transported. In areas where drainages cross the trail, a drainage system will be established that supports the natural drainage pattern and the efficient removal of flowing water from the trail alignment. A storm water pollution prevention plan would be developed and implemented prior to commencing any near-water activities. Regular site inspections would be conducted to endure that erosion-control measures are properly installed and functioning effectively. Prior to starting work each day, all machinery would be inspected for leaks (e.g., fuel, oil, and hydraulic fluid) and all necessary repairs would be made before the commencement of work. This measure is designed to avoid/minimize the introduction of chemical contaminants associated with machinery used in project implementation.

	Delineate wetlands and apply protection measures during projects. Perform project activities in a cautious manner to prevent damage caused by equipment, erosion, siltation, etc. Any machinery maintenance involving potential contaminants (e.g., fuel, oil and hydraulic fluid) would occur outside the riparian area, defined as the entire channel migration zone or a distance greater than 150 feet from the stream edge. This measure is designed to avoid/minimize the introduction of chemical contaminants associated with machinery used in project implementation. Hazardous spill clean-up materials would be on-site at all times. This measure is designed to avoid/minimize the introduction of chemical contaminants associated with machinery used in project implementation.
Wildlife and Fisheries	NPS Wildlife and Fisheries Management staff would provide input during the development of final construction drawings and contract specifications to ensure that potential impacts to native wildlife species (including fish, bats, bald eagles, fisher, migratory birds, amphibians, etc.) are avoided or minimized to the greatest extent possible.
Special Status Species	No clearing of vegetation or major construction activity would occur within suitable habitat for northern spotted owl or marbled murrelet during the breeding season. Work in areas adjacent to suitable habitat would occur outside of the early breeding season to ensure that noise related disturbance is avoided or minimized. Conduct work between two hours after sunrise and two hours before sunset when such work includes the use of equipment which produces noise above 92 decibels (such as chainsaws, heavy equipment, and helicopters) and would occur between April 1 and September 15. No trees that provide nesting habitat for marbled murrelet would be removed. To avoid adverse impacts to breeding murrelets, any noise-producing construction activities above ambient noise levels within 35 yards of murrelet habitat would not begin until after August 6, during murrelet late breeding season (August 6 to September 15), and would be initiated as late as possible. This would ensure that heavy equipment operation would occur outside of the prime breeding season, yet provide a window for construction to be completed before winter weather. During the project work period between August 6 and September 15 within 35 yards of marbled murrelet habitat, no work that generates above ambient noise levels would take place at night or within 2 hours of sunrise and sunset, when murrelets are known to be most active. The park would maintain strict garbage control to prevent scavengers (e.g. corvids), which are predators on murrelet nests, from being attracted to the project area. No food scraps would be discarded or fed to wildlife.
Visitor	Visitors would be informed in advance of construction activities.

Experience and Recreational Resources	The project area would be closed to visitor use during construction activities. A traffic management plan would be developed and implemented to avoid or reduce impacts to local residents and park visitors using park roads during construction. Short-term closures may be required. The ONP Public Information Officer would be provided with the project schedule (as soon as it is known) and periodic update of project work to inform visitors of project status and access.
Cultural Resources	A Cultural Resource Treatment Plan will be developed to address how contributing features of the eligible National Register railroad will be restored or rehabilitated. Construction of the trail will be coordinated with the park Chief of Cultural Resources to insure that all work is done in compliance with this treatment plan. Should any significant archeological resources be uncovered during construction, work would be halted in the area and the park archeologist, Office of Archeology and Historic Preservation (OAHP), and appropriate Native American Tribes would be contacted for further consultation. In the unlikely event that human remains are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (1990) would be followed. The NPS would ensure that all contacts and subcontractors are informed of the penalties for illegally collecting artifacts or intentionally damaging archeological sites or historic properties. Contractors and subcontractors also would be instructed on procedures to follow in case archeological resources are uncovered during construction. Equipment and material staging areas would avoid known archeological resources.

APPENDIX B

TUNNEL PROFILES, SHOTCRETE AND ROCK BOLT DETAILS



The diagrams illustrate three different tunnel cross-sections:

- FULL FRMS AND ROCK BOLTS SECTION:** A rectangular cross-section with a diagonal line from the top-left to the bottom-right, and a smaller diagonal line in the bottom-right corner.
- UNLINED SECTION:** A simple rectangular cross-section with no internal lines.
- PARTIAL FRMS AND ROCK BOLTS SECTION:** A rectangular cross-section with two diagonal lines forming an 'X' shape, and a small diamond shape in the center.

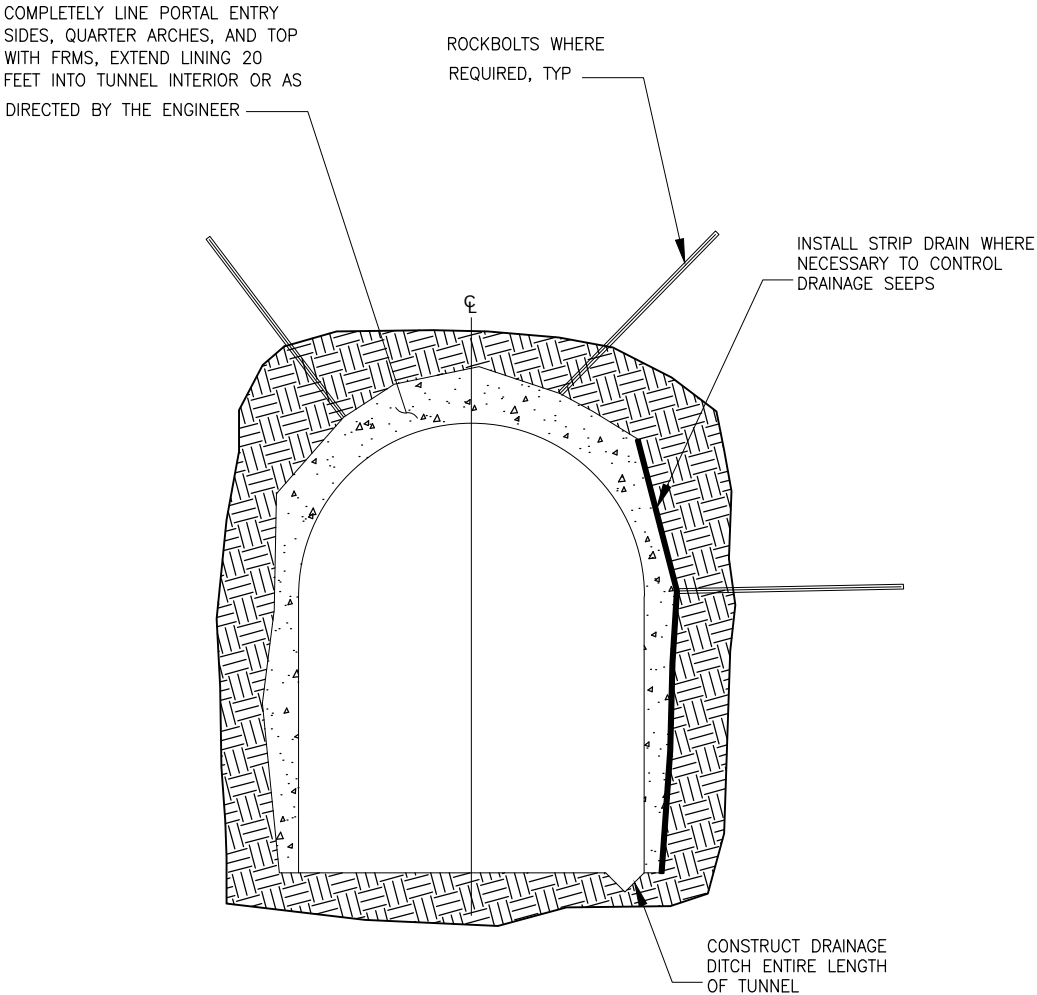
Plan view of the bridge deck. The diagram shows a rectangular bridge deck with a central span and two portals. The left portal is labeled "SOUTH PORTAL" and the right portal is labeled "NORTH PORTAL". The main span is labeled "MAIN SPAN". The bridge is oriented horizontally. Stationing is indicated along the bottom edge, with markers at 0+00, 0+20, 3+70, and 3+90. Above the bridge, there are three circular markers labeled "A 02", "B 02", and "A 02" from left to right, each with a small arrow pointing to the right.

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TUNNEL REPAIR CROSS SECTIONS

GENERAL NOTES:

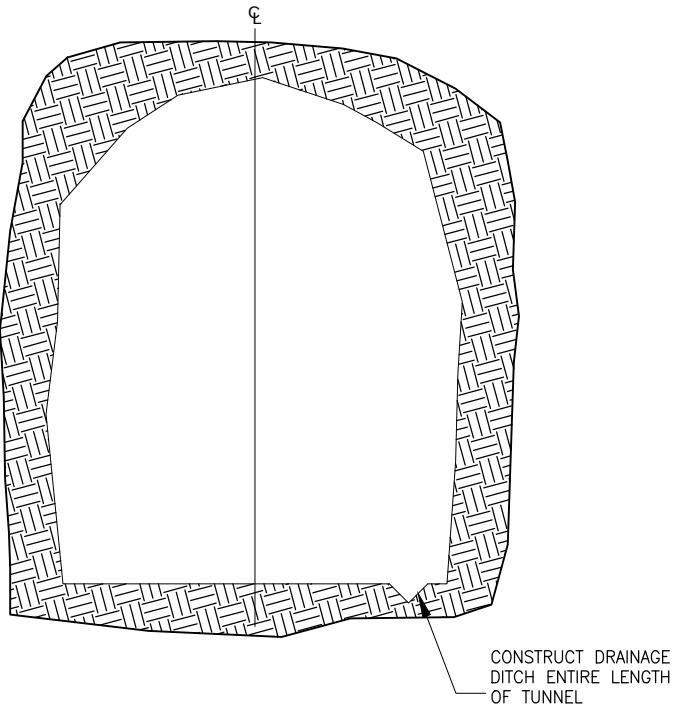
- 1. SCALE ANY LOOSE ROCK THROUGH THE ENTIRE LENGTH OF THE TUNNEL AND AT PORTAL LOCATIONS.
- 2. REMOVE ALL ROCK ACCUMULATIONS AND TIMBER DEBRIS FROM WITHIN TUNNEL.
- 3. INSTALL ROCKBOLTS WHERE DIRECTED.
- 4. APPLY FRMS AT LOCATIONS SHOWN ON PROFILE (SHEET 01).



A FULL FRMS AND ROCK BOLTS SECTION
SCALE: NTS

SHORT TUNNEL: STA 0+00 TO 0+20
STA 1+20 TO 1+40

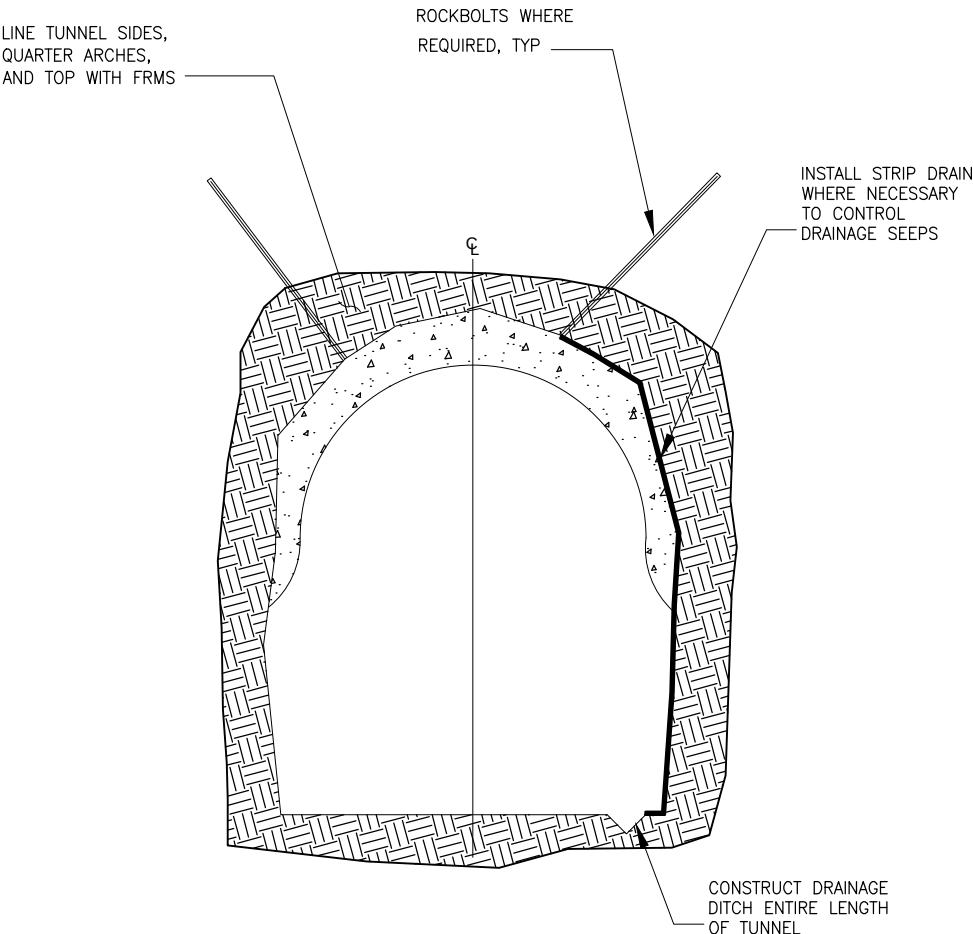
LONG TUNNEL: STA 0+00 TO 0+20
STA 3+70 TO 3+90



B UNLINED SECTION
SCALE: NTS

SHORT TUNNEL: STA 0+20 TO 0+60

LONG TUNNEL: STA 0+20 TO 3+70



C PARTIAL FRMS AND ROCK BOLTS SECTION
SCALE: NTS

SHORT TUNNEL: STA 0+60 TO 1+20

No.	REVISION	BY	APP'D	



JACOBS ASSOCIATES
Engineers/Consultants

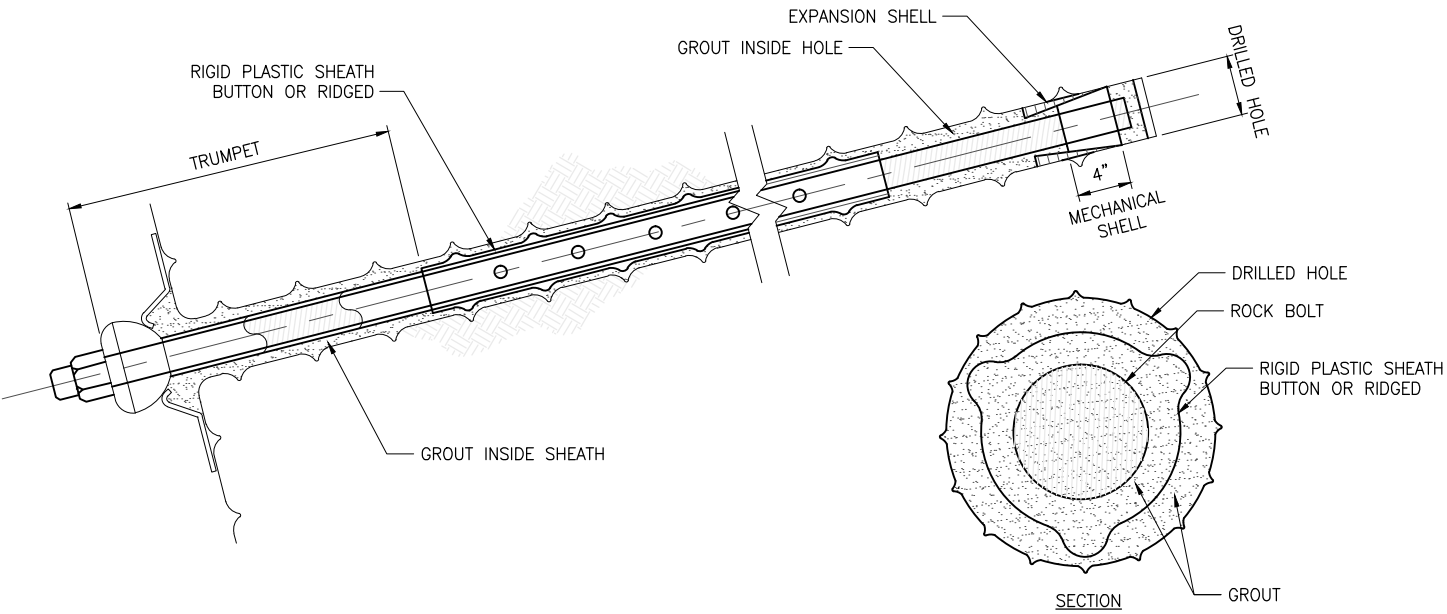


DESIGNED:	CHECKED:
CR	
DRAWN:	APPROVED:
PDC	GM
HORZ SCALE:	VERT SCALE:
AS NOTED	NA

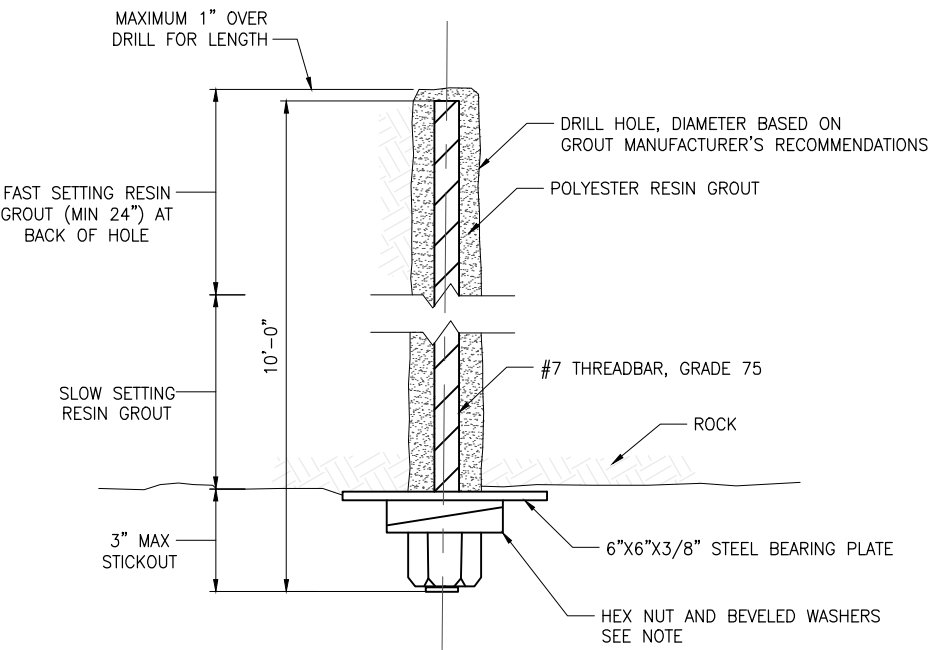
CLALLAM COUNTY
SPRUCE TUNNEL
REHABILITATION PROJECT

LONG AND SHORT TUNNEL SECTIONS

DATE:	APRIL 29, 2011
JOB NO:	4352.0
DRAWING NO:	02
SHEET NO:	OF
02	03



1 DETAIL - DOUBLE CORROSION PROTECTION ROCK BOLT (DCP)
SCALE: NTS



2 DETAIL - RESIN GROUTED ROCK BOLT (RGRB)
SCALE: NTS

NOTE: CONTRACTOR MAY USE DOME ANCHOR NUTS AS A SUBSTITUTE TO HEX NUT AND BEVELED WASHERS. IF DOME NUTS ARE USED REPLACE 3/8" STEEL PLATE WITH 1/2" STEEL PLATE DISHED TO ACCEPT DOME NUT.

No.	REVISION	BY	APP'D	



JACOBS ASSOCIATES
Engineers/Consultants

PanGEO
INCORPORATED

DESIGNED:	CHECKED:
CR	
DRAWN:	APPROVED:
PDC	GM
HORZ SCALE:	VERT SCALE:
AS NOTED	NA

CLALLAM COUNTY
SPRUCE TUNNEL
REHABILITATION PROJECT

DETAILS

DATE:	APRIL 29, 2011
JOB NO:	4352.0
DRAWING NO:	03
SHEET NO:	OF
03	03

Appendix C – Impairment Determination for the NPS Preferred Alternative

Chapter 1 of the EA describes the related federal acts and policies regarding the prohibition against impairing natural and cultural resources and values in units of the national park system. The prohibition against impairment originates in the National Park Service (NPS) Organic Act, which directs that the NPS shall:

*...Promote and regulate the use of the...national parks...which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them **unimpaired** for the enjoyment of future generations.*

According to NPS Management Policies, an action constitutes an impairment when its impact “would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values” (NPS 2006, sec. 1.4.5). To determine impairment, the NPS must evaluate “the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts” (NPS 2006, sec. 1.4.5).

National park system units vary based on their enabling legislation, natural and cultural resources present, and park missions; likewise, the activities appropriate for each park and for areas in each park also vary. For example, an action found appropriate in one area administered by the NPS could impair resources in another park. As stated in the NPS Management Policies 2006 (NPS 2006, sec. 1.4.5), an impact on any park resource or value may constitute an impairment, but an impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is,

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park; or
- Key to the natural or cultural integrity of the park; or
- identified as a goal in the park’s General Management Plan or other relevant NPS planning documents.

Interim Guidance

The NPS has issued interim *Guidance for Impairment Determinations in NPS NEPA Documents (Interim Guidance)* (NPS 2010). The Interim Guidance states that a written impairment determination must be completed the NPS preferred alternative. Impairment findings are not required for visitor experience, socioeconomics, public health and safety, environmental justice, land use, or park operations, because impairment findings relate back to park resources and values identified in the *NPS Organic Act*.

In evaluating whether or not the NPS Preferred Alternative would result in impairment, the responsible NPS manager must provide: a brief description of the condition of the resource; whether the resource is necessary to fulfill the purposes for which the park was established; whether the resource is key to the natural or cultural integrity of the park or to the opportunity for

enjoyment of the park; whether the resource is identified as a significant resource in the park's planning documents; and a discussion of why the action will or will not result in impairment of the resource including a discussion of the context, severity, duration and timing of any impacts, and any mitigation measures, if applicable.

The resource impact topics carried forward and analyzed for the Spruce Railroad Trail environmental assessment (SRRT EA) preferred alternative are: geologic features and soil, water resources, air quality, vegetation, wetlands, wildlife and wildlife habitat, unique or important fish and fish habitat, threatened and endangered species, cultural resources, soundscapes, and scenic values.

Geologic features and soil

The topography of the watershed is one of extremes. Lake Crescent is enclosed by steep ridges on all sides. Elevations range from approximately 575 feet at lake level to roughly 1,500 feet on the northern ridge, and 4,500 feet on southerly ridges. In general, soils tend to be thin and poorly developed due to glacial scouring of the bedrock of the northern foothills belt (Brown and Grower 1960). Sensitive soils are associated with steep slopes, incised stream channels, unstable bedrock, and water seepage areas. There is evidence of mass slope failure within the watershed; four areas of landslide deposits have been mapped by the U.S. Geological Survey. There are several areas along the existing Spruce Railroad Trail and Phase 1 of the ODT where rock slide and debris flow activity is ongoing.

Geologic features and soil are not specifically identified in the enabling legislation for Olympic National Park, although the legislation does make reference to the "outstanding mountainous country." The Olympic National Park General Management Plan (GMP, 2008) included eight "significance statements." Significance statements capture the essence of the national park's importance to our country's natural and cultural heritage and help managers make decisions that preserve the resources and values necessary to accomplish Olympic National Park's purpose.

The significance statement that best captures the geological values of the park is, "The ecosystems protected within Olympic National Park contain a unique array of habitats and life forms, resulting from thousands of years of geographic isolation, along with extreme gradients of elevation, temperature, and precipitation. At least 16 kinds of animals and 8 kinds of plants on the Olympic Peninsula exist nowhere else in the world."

Although geologic features and soils are not identified as key resources for the natural or cultural integrity of the park, they do provide the foundation for the outstanding biological and cultural resources the park is well known for.

Under the preferred alternative (Alt. 3), the geologic resources and soils within the project area would be adversely affected due to the construction and expansion of the Spruce Railroad Trail in both the Lake Crescent and Sol Duc areas. Best management practices would be implemented to avoid or minimize the potential for construction related impacts during project implementation, but due to the extent of development proposed there would be local, long-term to permanent, moderate to major impacts associated with the excavation, grading, placement of

fill, and compaction of soils in the project area. However, these impacts would not result in a loss in the integrity of the park's geologic resources or soils, nor would they result in wide-spread impacts that would impair the ability of the NPS to achieve the mandate and purpose for the park as established by the 1938 enabling legislation (Act of June 29, 1938, 35 Stat. 2247) and associated House Report (House Report 2247, April 28, 1938).

Because the extent and intensity of disturbance is limited to the project area, and best management practices would be implemented to avoid or reduce most impacts, geologic resources and soils would not be impaired.

Water Resources

Lake Crescent is a pristine deep-water lake of glacial origin located 15 miles west of Port Angeles in the northern portion of Olympic National Park. The watershed is 39 square miles, excluding the lake area, with 32 streams feeding the lake. Of these, 22 are intermittent. Only one stream, the Lyre River, drains the lake. The Lyre River exits the lake at its northeast corner. The Lyre River flows north 5¼ miles to the Strait of Juan de Fuca. A major roadway, Highway 101 is located along the south shore and the historic Spruce Railroad grade runs along the north shore of the lake. Both of these transportation corridors cut through riparian areas.

Water resources are not specifically identified in the enabling legislation for Olympic National Park. The GMP included eight "significance statements." The significance statement that best captures the water resource values of the park is, "Olympic National Park contains some of the last remaining undisturbed, contiguous aquatic habitat throughout the range of several west coast fish species. The park protects 12 major river basins, more than 3,500 miles of rivers and streams within 13 watersheds, more than 300 high mountain lakes, and two large lowland lakes. The park also supports more than 70 unique stocks of Pacific salmonids, 29 freshwater fish species, and two endemic fish species."

Lake Crescent is one of the two lowland lakes referenced in the significance statement above. The two endemic fish species described both reside in Lake Crescent. As such, Lake Crescent is a key resource that supports the natural integrity of the park, including significant biological resources.

Under the preferred alternative (Alt. 3), water resources within the project area would be adversely affected due to the construction and expansion of the Spruce Railroad Trail in both the Lake Crescent and Sol Duc areas. This includes the installation of bank armoring in multiple locations along the north shore of Lake Crescent. Best management practices would be implemented to avoid or minimize the potential for construction related impacts during project implementation, but due to the extent of development proposed there would be site-specific and local, short-term, negligible to moderate impacts to surface hydrology and water quality associated with excavation and grading during construction. After construction, Alternative 3 would result in site-specific and local, permanent, negligible to moderate impacts to surface hydrology and water quality associated with the increase in developed area and hardened surfaces, including the areas of bank armoring described above.

Because these impacts would not result in a loss in the integrity of the park's water resources, including hydrologic processes and water quality, implementation of the NPS preferred alternative, as described in the SRRT EA, would not impair water resources.

Air Quality

Olympic National Park is designated as a Class I area as defined by the Clean Air Act, as amended. Class I areas are afforded the highest degree of protection under the Clean Air Act. This designation allows very little additional deterioration of air quality. Protecting the overall park visibility and impacts on the views that are most important to park visitors is a management concern. Pristine air quality is important to the visitor experience because it allows the long-range scenic views of the Olympic Mountains. Air quality is also important for human health and the preservation of natural and cultural resources.

Air quality is not identified in either the Olympic National Park enabling legislation or the park's significance statements. However, air quality is key to the integrity of natural and cultural resources, and also to the ability for park visitors to enjoy park resources and values.

Implementation of the park's preferred alternative would result in adverse, site-specific and local, short-term, negligible to minor impacts associated with the use of motorized vehicles and equipment to construct and maintain the trail system. Because the degree of impact is minor, air quality would not be impaired.

Vegetation

The entire project area is located within the western hemlock zone. This is the most widespread zone in the park. Dominant tree species are western hemlock, Douglas-fir, and western red cedar. Common shrubs include salal, vine maple, Oregon grape, red huckleberry, Alaska huckleberry, salmonberry, and rhododendron. Several disjunct populations of plants are found within the watershed, including poison oak, yerba de selva, and seaside juniper. Disjunct populations are relatively small populations of plants that are separated, often by hundreds of miles, from the main population.

Water lobelia, a state listed sensitive plant, is found in shallow water on the edges of lakes and ponds, including Lake Crescent. The species occurs in nutrient-poor water bodies with exceptionally clear water. Water lobelia is harmed by sediment and susceptible to damage from application of herbicides to control aquatic weeds, shoreline development, water pollution from recreational equipment, and trampling.

Most of the project area, including both Lake Crescent and the Sol Duc, has been previously logged. Because the area has experienced a good deal of disturbance, mainly prior to inclusion within Olympic National Park, there is considerable diversity of forest stand structure. The majority of the watershed is in old-growth forest (52%), followed by mature stands (39%). The remaining nine percent is in young forest, shrubs, meadows and rocks. The area proposed for development in this EA includes both mature stands and young forest. No old-growth trees are proposed for removal.

The preservation of primeval forests of Sitka spruce, western hemlock, Douglas fir, and western red cedar is the one of the primary reasons Olympic National Park was established in 1938. Likewise, the “old growth temperate forests of ancient and immense trees” are listed among the park’s significance statements. The integrity of the forests is key to the natural and cultural integrity of the park, and for its enjoyment.

The preferred alternative would result in the clearing of vegetation to construct two miles of new trail in the Sol Duc area. The existing Spruce Railroad Trail would be widened, requiring additional vegetation removal along 3.7 miles of trail. This would require the removal of up to 258 trees between 11” and 30” in diameter. Tree species that would be affected include Douglas fir, western hemlock, spruce and western red cedar. Alder and maple trees would also be affected. None of the trees are within “primeval” or old-growth forest stands. This would result in adverse, site-specific and local, long-term to permanent, moderate to major impacts to vegetation due to trail development.

Because the trees proposed for removal are not old-growth, and because they would not result in a loss of biological integrity to the surrounding 900,000 acres of forest remaining within the park, including approximately 4,000 acres of forest on the north shore of Lake Crescent, this impact would not constitute impairment.

Wetlands

The Lake Crescent watershed contains 22 wetlands identified on National Wetlands Inventory maps (Fish and Wildlife Service National Wetlands Inventory maps, 1987). Most of these wetlands are located in the upper reaches of the watershed and are classified as palustrine or riverine wetlands. An initial assessment of the Spruce Railroad Trail (SRRT) project area found several areas with wetland characteristics. These areas include lands adjacent to the SRRT parking lot, several small areas along the existing SRRT that are currently spanned by small trail bridges, a wetland of undetermined size to the east of the rail grade in the Sol Duc area, and the shoreline at the outlet to the lake.

Wetlands are not specifically identified in either the park’s enabling legislation or in the park significance statements, although they are among the many “ecosystems protected within Olympic National Park containing a unique array of habitats and life forms...” Wetlands are key to natural integrity, particularly where they are located upslope of Lake Crescent near the outlet to the Lyre River.

Formal wetland delineation would be conducted prior to finalizing the construction plans for the preferred alternative, if selected. If wetlands are found in the project area the trail alignment would be modified to avoid the wetland, as would any other trail-related development. Small wetlands may be spanned by boardwalk or trail bridges to avoid impacts as well. Any remaining impacts to wetlands would be site-specific, long-term to permanent, and negligible to minor. Due

to these best management practices, no major impacts would occur, the integrity of wetlands would be maintained or restored, and no impairment would occur.

Wildlife

Large native mammals found within the project area include Roosevelt elk, Columbia black-tailed deer, black bear, and cougar. River otters inhabit the lake and can sometimes be seen swimming and playing along the shore. Fishers were recently reintroduced in the park, and several have established home ranges around Lake Crescent. Many small mammals and several species of amphibians and reptiles occur in the area, including the rarely seen rubber boa and alligator lizard.

A wide range of resident and migratory birds are found within the project area, including bald eagles, and marbled murrelet.

Protection of wildlife and wildlife habitat is included in both the park's enabling legislation and in the park significance statements. Native wildlife and wildlife habitat is key to the natural integrity of Olympic National Park.

Implementation of the preferred alternative would remove some forest habitat to support trail development, and noise from construction and maintenance of the trail would result in some ongoing disturbance to wildlife. Best management practices would be implemented to minimize disturbance, including scheduling vegetation removal to not occur during the primary summer breeding season. Trail development would result in adverse, site-specific to local, long-term to permanent, minor to moderate impacts.

Because the surrounding park lands provide alternate habitat area, and because conservation measures would be implemented to avoid or reduce many construction-related impacts, these disturbances would not affect the biological integrity of wildlife or wildlife habitat within Olympic National Park. No wildlife fatality is expected to result from the implementation of the preferred alternative. Because of these reasons, wildlife resources would not be impaired.

Unique or Important Fish or Fish Habitat

Lake Crescent is home to two endemic trout species - the Beardslee trout (*Oncorhynchus mykiss*) and the Crescenti trout (*O. clarkii*). Other fish species present in the lake are kokanee salmon (*O. nerka*), prickly sculpin (*Cottus asper*), pygmy whitefish (*Prosopium coulteri*), and perhaps Pacific lamprey (*Lampetra tridentata*) (Meyer and Fradkin, 2002).

Resource management actions taken to date in an effort to preserve the lake's unique fish populations have focused on harvest regulations intended to minimize direct fishing mortality, stock assessment surveys targeting the Beardslee and Crescenti trout, and land and water use practices intended to ensure critical habitat for the Beardslee and Crescenti trout remains intact. Since 2001 catch-and-release fishing regulations have been implemented on the lake. The

abundance of both Beardslee and Crescenti trout has slowly grown, though annual spawning escapement estimates for both species remain well under 500 fish.

Although fish and fish habitat are not specifically identified within the park's enabling legislation, they may be considered to be within the scope of "other wildlife indigenous to the area." Both species of endemic fish are referenced in the park's significance statements, and both are key to the natural integrity of Lake Crescent.

Development associated with the preferred alternative has the potential to disturb fish and fish habitat, however best management practices would be implemented to avoid or minimize disturbance to the greatest extent possible. Construction would result in adverse, site-specific and local, short-term, negligible to moderate impacts from water quality impacts associated with excavation and grading. After construction there would be negligible to minor impacts from new bank armoring and increased sediment transport into Lake Crescent from developed areas, although this would be minimized by paving the parking lots and dirt road near the Lyre River to reduce erosion.

Because conservation measures would be implemented, and the anticipated impacts would be negligible to minor in the long-term, the proposed action would not harm the biological integrity of fisheries or fish habitat in Lake Crescent. These resources would remain unimpaired.

Threatened and Endangered Species

The U.S. Fish and Wildlife Service has identified two listed T and E (threatened or endangered) avian species that are known to occur in the Lake Crescent watershed and likely nest here; the marbled murrelet and northern spotted owl, both classified as threatened. Habitat considered suitable for murrelet occupation includes forested areas to 3,500 feet on the east side of the park, and to 3,000 feet on the west side of the park, including the Sol Duc and Lake Crescent watersheds.

Approximately 327,000 acres of forested area within the park is considered suitable marbled murrelet habitat. For purposes of analysis, the murrelet breeding season in Washington is broken into two periods: early breeding season is April 1 through August 5, and late breeding season is August 6 to September 15.

Northern spotted owls formerly occurred along the north shore of Lake Crescent in the project area but none have been detected since 2002, despite regular monitoring of both known territories. The lakeshore area is heavily used by barred owls and as a result it is unlikely that spotted owls will use this area for nesting or roosting.

For purposes of analysis, spotted owl breeding season in Washington is broken into two periods: early breeding season is March 1 through July 15, and late breeding season is July 16 to September 30.

One candidate species for listing under the Endangered Species Act that occurs at Lake Crescent is the Pacific fisher, which is found in forested habitats along the lake, including in the project area.

As a subset of indigenous wildlife, threatened and endangered species are considered to be included within the scope of the park's enabling legislation. They are identified in the park's significance statement as being residents of the park's old-growth temperate rainforests. These species are key to natural integrity of the park.

Implementation of the preferred alternative would occur in a manner that avoid or minimizes impacts to listed species to the greatest extent possible. This includes scheduling vegetation removal to occur outside of the breeding season, scheduling construction adjacent to suitable habitat outside of the early breeding season, and scheduling work during the time of day it is least likely to disturb marbled murrelets while feeding young. Any additional conservation measures identified through consultation with the U.S. Fish and Wildlife Service would also be implemented.

Construction would result in adverse, site-specific and local, long-term to permanent, minor to moderate impacts due to clearing of vegetation and noise disturbance. However, due to the mitigation measures described above, the project would not harm individual birds or the integrity of suitable habitat. As such, it would not result in impairment to threatened and endangered species or habitat.

Cultural Resources (National Register eligible properties)

The adaptive re-use of the historic Spruce Railroad is a key element of the park's preferred alternative. The Spruce Railroad is a historic property eligible for the National Register of Historic Places. It was determined nationally significant due to its association with World War I and the Spruce Division. The existing Spruce Railroad Trail (SRRT) follows three miles of the railroad grade along the north shore of Lake Crescent. This trail segment is proposed to be widened under the preferred alternative. Additionally, 1.5 miles of new trail is proposed on the historic rail grade in the Sol Duc area of the park.

Although cultural resources and the Spruce Railroad are not identified in the park's enabling legislation, they are referenced in the park's significance statements. The integrity of the Spruce Railroad is essential to the cultural integrity of the Lake Crescent and Sol Duc areas, and the park. This historic property, including the two historic railroad tunnels, is also key to visitor enjoyment in the project area.

The preferred alternative has the potential to result in an adverse effect to this historic property during construction; however the park would develop and implement a treatment plan to guide the rehabilitation and adaptive reuse of the historic Spruce Railroad to avoid adverse effects to the greatest extent possible. Implementation of the preferred alternative would not alter the Spruce Railroad to the extent that it is no longer eligible for the National Register of Historic Places, and as such, this resource would not be impaired.

Soundscapes

Although many natural sounds occur within the project area, maintenance of the existing SRRT and associated parking lots and access roads requires the use of motorized vehicles and equipment that alter the natural soundscape. Chainsaws are used to clear downed trees from the trail; construction equipment is used to maintain the grade of the existing gravel roads and parking lot. Vehicles are used to access the trailheads to service the existing vault toilets and remove trash. Highway 101 can be heard from the project area in both the Lake Crescent and Sol Duc portions of the proposed project. Implementation the preferred alternative would result in increased noise during construction, and also from the ongoing maintenance and use of the expanded trail system.

Soundscapes are not identified in the enabling legislation or the park's significance statements, although natural quiet and sounds are a key factor that contributes to the natural integrity of the park and visitor enjoyment.

Implementation of the project would result in adverse, site-specific and local, short-term, minor to major impacts during construction and adverse, site-specific and local, negligible to moderate impacts associated with ongoing use and maintenance. The project area is located in a developed area with relatively high ambient noise levels from nearby roads and development. As such, the additional impacts proposed would not affect the integrity of soundscapes in the long-term, and would not result in impairment.

Scenic Values

The Lake Crescent watershed offers abundant scenic resources; from the lake itself to the surrounding mountains, forests, rocky outcrops and clear-flowing streams. Nestled in the deep glacial valley beneath steep forested hillsides, Lake Crescent is a spectacular sight with dramatic views of Mount Storm King, Pyramid Mountain, and forested ridgelines. From high on Mount Storm King and Pyramid Mountain visitors can find sweeping views of the watershed and Olympic Mountains. Perhaps the most significant scenic resource is the lake itself, with steep drop offs, it's turquoise hue and clarity is exceptional.

Although the quality of the scenery in the Lake Crescent area is outstanding, it is not specifically referenced in either the park's enabling legislation or significance statements, it is absolutely key to the integrity of Olympic National Park, particularly related to visitor enjoyment.

Construction proposed in the preferred alternative would result in impacts to visual resources, particularly during construction at Lake Crescent, but due to the retained forest in most areas downslope of the proposed trail, these impacts would be minimal in the long-term. There would be some additional impact from the installation of bank stabilization that would be visible from the lake and from Highway 101 that would be ongoing. Construction the preferred alternative would result in site-specific and local, short-term to permanent, minor to moderate impacts.

Implementation of the preferred alternative would not harm the integrity of visual resources in the long-term, and would provide increased access from the trail to other scenic vistas in the

area. The area of the project located in the Sol Duc is between Highway 101 and downslope of the Sol Duc Road. It is not visible from either location along most of the proposed route. As such, construction and operation of the trail would not noticeably affect scenic values in this area. In the absence of ongoing, major impacts to visual resources, scenic values would remain unimpaired.

In conclusion, the preferred alternative, Alternative 3, would not result in any direct, indirect, or cumulative impacts to park resources or values that would constitute “Impairment,” a violation of the NPS Organic Act.

SRRT EA Cumulative Impact Summary

Reasonably Foreseeable						
Past Actions	Current Actions (Alt 1)	Future Actions	Alt 2: Recreation Trail	Alt 3: NPS Preferred	Alt 4: County Proposal	
PHYSICAL ENVIRONMENT						
Geologic Features and Soils	Construction of the Spruce Railroad and tunnels resulted in impacts to the geologic features and soils on the north shore of Lake Crescent, in the Sol Duc area, and outside of the park.	Railroad features are deteriorating, no new geological impacts other than background levels of erosion.	Railroad features are deteriorating, no new geological impacts other than background levels of erosion would continue.	There would be additional disturbance to geologic features and soils associated with the construction of 1.9 new miles of trail in the Sol Duc area, widening of 1.1 miles on the existing SRRT, expansion of the SRRT parking lot, and construction of an access trail on CDJR.	There would be additional disturbance to geologic features and soils associated with the construction of 2 new miles of trail in the Sol Duc area, widening of 3.7 miles on the existing SRRT, expansion of the SRRT parking lot, and construction of an access trail on CDJR.	There would be additional disturbance to geologic features and soils associated with the construction of 1.5 new miles of trail in the Sol Duc area, widening of 3 miles on the existing SRRT, and construction of ~.7 miles of new trail in Segment D-ADA.
	Construction of Highway 101 on the south shore of Lake Crescent resulted in impacts to the geologic features and soils on the south shore of Lake Crescent, and outside of the park.	Routine maintenance and repairs to Highway 101 results in minor impacts to geologic features and soils.	Routine maintenance and repairs to Highway 101 would continue to result in minor impacts to geologic features and soils.	Routine maintenance and repairs to Highway 101 would continue to result in minor impacts to geologic features and soils.	Routine maintenance and repairs to Highway 101 would continue to result in minor impacts to geologic features and soils.	Routine maintenance and repairs to Highway 101 would continue to result in minor impacts to geologic features and soils.
	Construction of the park's existing 600 miles of hiking trails and additional system of roads resulted in impacts to the geologic features and soils throughout the park, including the project area.	Routine maintenance and repairs to the park's existing trail and road system results in impacts to geologic features and soils.	Routine maintenance and repairs to the park's existing trail and road system would result in continuing impacts to geologic features and soils.	In addition to the existing level of maintenance and repairs to the park's trail system, under Alt 2 the park would add approximately 2 miles of new hiking trail and expanded parking and trailhead facilities. This would add slightly to the overall disturbance to geologic features and soils in the context of the broader system.	In addition to the existing level of maintenance and repairs to the park's trail system, under Alt3 the park would add approximately 2 miles of new hiking trail and expanded parking and trailhead facilities. This would add slightly to the overall disturbance to geologic features and soils in the context of the broader system.	In addition to the existing level of maintenance and repairs to the park's trail system, under Alt 4 the County would add approximately 1.5 miles of new hiking trail in the Sol Duc area and approximately 0.7 miles of new trail in the Lake Crescent Area. This would add slightly to the overall disturbance to geologic features and soils in the context of the broader system.

	Construction of other sections of regional trail networks outside the park have impacted geologic features and soils.	Routine maintenance and repairs to the existing trail systems results in impacts to geologic features and soils.	In addition to routine maintenance and repairs, new section of regional trail are currently under construction or planned for construction in the near future, particularly areas of the proposed Olympic Discovery Trail. This includes new trail on USFS lands adjacent to the park, among others.	-	-	-
Hydrology and Water Quality	Visitor and Administrative use has resulted in increased sediment, nutrient, and contaminant loads in areas of development adjacent to surface waters. Construction along the shoreline and within riparian areas have also affected hydrology and water quality to varying extents.	Routine use, maintenance and repairs to existing infrastructure results in continuing impacts to water resources associated with altered hydrologic patterns and introduction of contaminants from developed areas, including Highway 101, other roads, and shoreline development. Despite the current use levels, water quality at Lake Crescent has remained exceptionally high.	Routine use, maintenance and repairs to existing infrastructure would continue to alter and affect water resources, both within and outside of the project area. New development on private lands adjacent to Lake Crescent would likely occur as property owners develop or maintain their lots.	In addition to the existing level of use, maintenance and repairs to existing infrastructure, under Alt 2 the park would expand development as described above, this would include the installation of new bank armoring in several sections of the SRRT. This would add to the existing level of impact to water resources during construction, and also by adding to the extent of infrastructure with the potential to impact water resources.	In addition to the existing level of use, maintenance and repairs to existing infrastructure, under Alt 3 the park would expand development as described above, this would include the installation of new bank armoring in several sections of the SRRT. This would add to the existing level of impact to water resources during construction, and also by adding to the extent of infrastructure with the potential to impact water resources. Impacts would be somewhat lessened due to the paving of access road and parking areas to minimize sediment transport that is occurring in these areas.	In addition to the existing level of use, maintenance and repairs to existing infrastructure, under Alt4 the County would expand development as described above, this would include the installation of new bank armoring in several sections of the SRRT. This would add to the existing level of impact to water resources during construction, particularly due to the development of new trail near the Lyre River, and also by adding to the extent of infrastructure with the potential to impact water resources.
Air Quality	Vehicle emissions from visitor, administrative, residential, and industrial uses have affected regional air quality.	Routine use, maintenance, and repairs to road and trail infrastructure both within and outside of the park results in ongoing effects to air quality from vehicle emissions and use of motorized tools and equipment.	Air quality impacts are expected to be consistent with current use levels. No new developments with the potentially to measurably affect air quality are currently planned in the area.	In addition to background levels of air quality impacts, there would be some additional use of motorized vehicles and equipment to construct and maintain new trail as described above. This increase would be negligible in the context of local and regional air quality in the long term.	In addition to background levels of air quality impacts, there would be some additional use of motorized vehicles and equipment to construct and maintain new trail as described above. This increase would be noticeable during construction, but negligible in the context of local and regional air quality in the long term.	In addition to background levels of air quality impacts, there would be some additional use of motorized vehicles and equipment to construct and maintain new trail as described above. This increase would be noticeable during construction, but negligible in the context of local and regional air quality in the long term.

Vegetation	Extensive logging and vegetation removal has reduced the extent of old growth forests on the Olympic Peninsula. Construction and maintenance of roads and trails within and outside of the park required the removal of mature trees and other vegetation. Existing residential, recreational and industrial uses required removal of native vegetation throughout the region, including within the park.	Vegetation impacts are ongoing as a result of routine maintenance, repairs and use. This includes removal of hazard trees in developed areas and routine brushing to clear existing trail and road corridors and around buildings and utilities. Existing development in the Lake Crescent area threatens water lobelia when sediments from upslope use areas is deposited in shallow water habitats occupied by water lobelia.	Vegetation impacts would continue to occur from routine use and maintenance activities. Additional impacts would occur from new developments outside of the park associated with regional trail development, including construction of new trail on USFS lands adjacent to OLYM.	In addition to ongoing impacts, Alt 2 would result in construction related disturbance to approximately 6.6 acres due to widening or expanding SRRT and parking areas. This would result in the removal of up to 118 large trees (11" - 30" dbh). This would result in additional shoreline disturbance with the potential to affect water lobelia, but most new trail development would occur away from known lobelia habitat.	In addition to ongoing impacts, Alt 3 would result in construction related disturbance to approximately 11 acres due to widening or expanding SRRT and parking areas. This would result in the removal of up to 258 large trees (11" - 30" dbh). This would result in additional shoreline disturbance with the potential to affect water lobelia, but most new trail development would occur away from known lobelia habitat and paving of parking areas and roads would minimize future sediment transport near the Lyre River.	In addition to ongoing impacts, Alt 4 would result in construction related disturbance to approximately 14.4 acres due to widening or expanding SRRT, including development of new trail in the Lyre River area. This would result in the removal of up to 632 large trees (11" - 40" dbh). This would result in additional shoreline disturbance with the potential to affect water lobelia.
	Non-native plants have been introduced to the region, and the project site.	Ongoing use also provides opportunities for the introduction or spread of non-native plants, although best management practices are implemented to avoid or minimize this risk to the greatest extent possible.	Ongoing use also provides opportunities for the introduction or spread of non-native plants, although best management practices are implemented to avoid or minimize this risk to the greatest extent possible.	Ongoing use and development would continue to provide opportunities for the introduction or spread of non-native plants, although best management practices are implemented to avoid or minimize this risk to the greatest extent possible.	Ongoing use and development would continue to provide opportunities for the introduction or spread of non-native plants, although best management practices are implemented to avoid or minimize this risk to the greatest extent possible.	Ongoing use and development would continue to provide opportunities for the introduction or spread of non-native plants, although best management practices are implemented to avoid or minimize this risk to the greatest extent possible.
Wetlands	Development both within and outside of the park has resulted in the reduction of the extent and quality of wetland habitat in the region and across the country. The existing Lyre River trailhead parking lot is adjacent to a potential wetland area, and portions of the existing SRRT cross seasonal drainages with nearby wet areas.	Ongoing use and maintenance of infrastructure both within and outside the project area is resulting in ongoing effects to wetlands.	A formal wetland delineation is being completed for the project area. The park plans to remove a vacant building near the current SRRT parking lot at the Lyre River. Any areas identified as wetland would be rehabilitated to natural conditions.	A formal wetland delineation is being completed for the project area. Any wetlands within the proposed project area would be avoided. Areas of wetland that are currently affected by development would be rehabilitated to the greatest extent possible. Some areas would be crossed by bridges or boardwalks to prevent impacts to the movement of water.	A formal wetland delineation is being completed for the project area. Any wetlands within the proposed project area would be avoided. Areas of wetland that are currently affected by development would be rehabilitated to the greatest extent possible. Some areas would be crossed by bridges or boardwalks to prevent impacts to the movement of water.	A formal wetland delineation is being completed for the project area. Any wetlands within the proposed project area would be avoided or mitigated.

Wildlife and Wildlife Habitat	Human use and development both within and outside of the park has reduced the quantity and quality of wildlife habitat due to changes in species composition, habitat structure and ecosystem function.	Ongoing use and development continues to impact the quality and quantity of wildlife habitat both within and outside the park. Impacts in the park are primarily associated with front-country developed areas and with the use of aircraft and motorized tools in backcountry locations to maintain remote sections of the existing trail system.	In addition to ongoing levels of impact to wildlife and wildlife habitat, ongoing use and development would continue to occur both within and outside the park. Olympic National Park would continue to provide extensive intact habitat that provides alternate feeding, sheltering and breeding locations for many animals in the park and surrounding areas.	In addition to the ongoing and reasonably foreseeable impacts to wildlife and wildlife habitat, under Alt 2 there would be some loss of habitat due to new trail construction and some disturbance to surrounding habitat during construction and from ongoing use and maintenance of the expanded trail system. The park would continue to provide extensive habitat outside of the project area. Best management practices would be implemented to avoid or minimize disturbance due to construction and maintenance to the greatest extent possible.	In addition to the ongoing and reasonably foreseeable impacts to wildlife and wildlife habitat, under Alt 3 there would be additional loss of habitat due to new trail construction and some disturbance to surrounding habitat during construction and from ongoing use and maintenance of the expanded trail system. The park would continue to provide extensive habitat outside of the project area. Best management practices would be implemented to avoid or minimize disturbance due to construction and maintenance to the greatest extent possible.	In addition to the ongoing and reasonably foreseeable impacts to wildlife and wildlife habitat, under Alt 3 there would be the greatest loss of habitat due to new trail construction and some disturbance to surrounding habitat during construction and from ongoing use and maintenance of the expanded trail system. The park would continue to provide extensive habitat outside of the project area. Best management practices would be implemented to avoid or minimize disturbance due to construction and maintenance to the greatest extent possible.
Unique or Important Fish or Fish Habitat	Changes in human use patterns, including consumption of fish and alteration of fish habitat has reduced the distribution and abundance of native fish species. This includes the two endemic fish species present in Lake Crescent, although park management actions to reduce impacts to both species have been taken to protect both fish populations.	Ongoing use and development would continue to affect the quality and quantity of fish populations and fish habitat. Effects would be both positive and negative, since new development in some areas may be off-set by large restoration projects (such as the Elwha dam removal project) in others. NPS has an active monitoring and protection program in place at Lake Crescent to support the preservation of the two endemic fish species.	Current impacts, both positive and negative, would continue.	In addition to ongoing impacts, Alt 2 would result in construction related disturbance to approximately 6.6 acres due to widening or expanding SRRT and parking areas and the installation of new bank armoring in Segment A of the SRRT. This would result in some degree of new construction and maintenance related impacts to the Lake Crescent aquatic habitat, although best management practices would be implemented to avoid or minimize impacts to the greatest extent possible.	In addition to ongoing impacts, Alt 3 would result in construction related disturbance to approximately 11 acres due to widening or expanding SRRT and parking areas and the installation of new bank armoring in Segments A and B of the SRRT. This would result in additional new construction and maintenance related impacts to the Lake Crescent aquatic habitat, although best management practices would be implemented to avoid or minimize impacts to the greatest extent possible.	In addition to ongoing impacts, Alt 4 would result in construction related disturbance to approximately 14.4 acres due to widening or expanding SRRT and parking areas and the installation of new bank armoring in Segments A and B of the SRRT. This would result in additional new construction and maintenance related impacts to the Lake Crescent aquatic habitat, although best management practices would be implemented to avoid or minimize impacts to the greatest extent possible.

Threatened and Endangered Species	Development for human use both within and outside of the park has reduced the extent of suitable habitat for threatened and endangered species, such as the northern spotted owl and marbled murrelet. These changes affected the composition, structure, and function of species populations and habitat. Northern spotted owls are also being affected by increasing populations of barred owls, which displace spotted owls and have reduced available breeding habitat due to competition. A programmatic Biological Opinion was prepared during the preparation of the Olympic National Park General Management Plan.	Ongoing use and development both within and outside the park would continue to affect marbled murrelets and northern spotted owls. Barred owls are continuing to expand their range both within and outside the park. Conservation measures are implemented as part of ongoing park operations to avoid or minimize disturbance to T & E species to the greatest extent possible. Research and monitoring is ongoing.	The current level of disturbance to T & E species would continue, as would efforts to support recovery of listed species and efforts to avoid or minimize impacts to the greatest extent possible. There would be additional disturbance associated with new trail development outside the park, as well as from other land management practices outside the park, but within the local region.	Under Alt 2 the current level of disturbance would likely continue, as would conservation measures, but there would be some additional disturbance due to the construction of new trail and increased use and maintenance activities within or adjacent to suitable habitat for marbled murrelet and northern spotted owl. Best management practices would be implemented to avoid or minimize disturbance to the greatest extent possible. No loss of individual animals or nest trees would occur.	Under Alt 3 the current level of disturbance would likely continue, as would conservation measures, but there would be some additional disturbance due to the construction of new trail and increased use and maintenance activities within or adjacent to suitable habitat for marbled murrelet and northern spotted owl. Best management practices would be implemented to avoid or minimize disturbance to the greatest extent possible. No loss of individual animals or nest trees would occur.	Under Alt 3 the current level of disturbance would likely continue, as would conservation measures, but there would be some additional disturbance due to the construction of new trail and increased use and maintenance activities within or adjacent to suitable habitat for marbled murrelet and northern spotted owl. Best management practices would be implemented to avoid or minimize disturbance to the greatest extent possible.
Cultural Resources	Cultural resources, including: archeological resources, pre-historic and historic structures, cultural landscapes, and ethnographic resources have been adversely affected by past actions taken to restore natural conditions, to upgrade or replace old materials with new, and through unintentional impacts related to neglect or unplanned disturbance.	The existing level of adverse effect would continue under current conditions. However, new impacts would be avoided to the greatest extent possible through preservation maintenance of remaining historic properties, archeological monitoring and implementation of inadvertent discovery plans, and rehabilitation of some historic properties in areas where this would not unreasonably conflict with the preservation of natural resources.	Other effects to cultural resources that may occur in the reasonably foreseeable future include additional preservation maintenance and rehabilitation of historic properties in areas where this would not unreasonably conflict with the preservation of natural resources.	Under Alt 2 the historic Spruce Railroad would be affected as described below. Additionally, archeological monitoring and implementation of an inadvertent discovery plan would be implemented to avoid or minimize potential impacts to archeological resources associated with historic resort properties, historic logging camps, or prehistoric sites.	Under Alt 3 the historic Spruce Railroad would be affected as described below. Additionally, archeological monitoring and implementation of an inadvertent discovery plan would be implemented to avoid or minimize potential impacts to archeological resources associated with historic resort properties, historic logging camps, or prehistoric sites.	Under Alt 4 the historic Spruce Railroad would be affected as described below. Additionally, archeological monitoring and implementation of an inadvertent discovery plan would be implemented to avoid or minimize potential impacts to archeological resources associated with historic resort properties, historic logging camps, or prehistoric sites.

Historic Spruce Railroad	The Historic Spruce Railroad has been affected by the removal of track hardware, conversion of some sections to road, and other sections to trail. The two historic railroad tunnels have been closed through blasting that resulted in adverse effects. Benign neglect has allowed several features to deteriorate or be lost, including historic log cribbing, tunnel supports, dry laid rock wall, trestle bridges, and wooden culverts. Some sections of rail grade have been unmanaged for several years. Some sections of the historic Spruce Railroad retain integrity and were found to be eligible for the National Register of Historic Places. This historic property was determined to have national significance due to its association with World War I and the Spruce Division that supplied materials for airplanes.	Sections of the historic Spruce Railroad are being used as road, trail, or are unmanaged. Elements of the historic property are being lost due to benign neglects as historic fabric deteriorates. This includes the historic log cribbing, wood culverts, and wood tunnel supports. Areas of dry laid stone retaining wall are also failing.		Under Alt 2 the SRRT would be widened in Segment A. This would result in the rehabilitation of the railroad grade, but would also result in adverse effect to the remaining log cribbing and dry-laid stone retaining wall. Interpretation of the historic railroad would be improved. Adaptive re-use of railroad grade in the Sol Duc area would occur when 1.4 miles of historic rail grade are converted to trail. Deterioration of wood culverts and tunnel supports would continue.	Under Alt 3 the SRRT would be widened in Segments A, B and C. This would result in the rehabilitation of the railroad grade. The remaining log cribbing and dry-laid stone retaining wall would be rehabilitated as well. Interpretation of the historic railroad would be improved. Adaptive re-use of railroad grade in the Sol Duc area would occur when 1.4 miles of historic rail grade are converted to trail. Deterioration of wood culverts would continue and tunnel supports would be removed when the two historic railroad tunnels are reopened and stabilized to allow for visitor use.	Under Alt 4 the SRRT would be widened in Segments A, B and C. This would result in the rehabilitation of the railroad grade. The remaining log cribbing and dry-laid stone retaining wall would be adversely affected due to replacement with rip rap to provide a stable trail surface for construction. Interpretation of the historic railroad would be improved. Adaptive re-use of railroad grade in the Sol Duc area would occur when 1.4 miles of historic rail grade are converted to trail. Deterioration of wood culverts would continue and tunnel supports would be removed when the two historic railroad tunnels are reopened and stabilized to allow for visitor use.
Visitor Use and Experience	Olympic National Park provides world-class opportunities for visitors to experience the outstanding natural and cultural resources within the park. The Lake Crescent and Sol Duc areas are among the most visited areas within the park, providing a wide range of overnight and day use. Past development has resulted in the creation of a trail system containing over 600 miles of trail within the park. Very few miles of trail are universally accessible. Extensive trail opportunities also exist outside the park, including many areas that are universally accessible.	The existing level of visitor use would continue and existing infrastructure to support visitor use would remain. The SRRT would continue to support use by hikers, bicyclists and equestrians. Phase 1 of the ODT would provide 6 miles of universally accessible trail in the Lake Crescent area. Trails outside the park would continue to provide additional opportunities for people to experience and enjoy the Olympic Peninsula.	In addition to existing visitor use opportunities, new trail would be built outside the park, including new sections of trail on USFS lands adjacent to the project area. This would expand the current regional trail network and provide increased opportunities for visitors to experience and enjoy the Olympic Peninsula.	Under Alternative 2, new trail would be constructed in the Sol Duc area. This trail would be accessible, would support hikers and bicyclists. The existing SRRT would be widened and made universally accessible in Segment A. The remaining SRRT would remain essentially in the same condition, although some areas would be improved through the placement of gravel to address muddy areas. Trail access and parking would be improved, and there would be increased opportunities for people to experience and enjoy the Olympic Peninsula.	Under Alt 3, new trail would be constructed in the Sol Duc area. This trail would be accessible, would support hikers, equestrians and bicyclists. The existing SRRT would be widened and made universally accessible in Segments A, B and C. Segment D would be widened and paved, but would not achieve an accessible grade due to the slope of the hill within NPS boundaries. The two historic railroad tunnels would be opened. Trail access and parking would be improved, and there would be increased opportunities for people to experience and enjoy the Olympic Peninsula.	Under Alternative 4, new trail would be constructed in the Sol Duc area. This trail would be accessible, would support hikers, equestrians and bicyclists. The existing SRRT would be widened and made universally accessible. This would require the development of new trail, including a short section on lands that are privately owned. The two historic railroad tunnels would be opened. There would be increased opportunities for people to experience and enjoy the Olympic Peninsula.

Soundscapes	Use and development both within and outside the park has resulted in numerous activities that affect natural soundscapes. This includes roads, trail, housing, business and recreational developments. The construction of Highway 101 on the south shore of Lake Crescent has added traffic noise to the area.	results in noise related impacts that affect biological as well as experiential conditions. Roads and trails require the use of motorized vehicles and tools to maintain surfaces and provide adequate clearance. Vehicle traffic on road and motorized boats on Lake crescent also add noise to the environment. Aircraft use also affects the region. Noise levels vary depending on the season and time of day, and despite the level of development, natural sounds are	Ongoing noise related impacts would continue to occur. New development and use within the project area would also add some degree of additional noise on adjacent lands.	Under Alt 2 there would be short term noise increase due to construction of new trail in the Sol Duc area and the widening of Segment A on the existing SRRT, and also during the expansion of the SRRT parking lot near the Lyre River and the development of accessible parking and an access trail on CDJR. There would be some additional noise associated with the ongoing use and maintenance of the expanded trail system.	term noise increase due to construction of new trail in the Sol Duc area and the widening of the existing SRRT, and also during the expansion of the SRRT parking lot near the Lyre River and the development of accessible parking and an access trail on CDJR and the paving of the Water Line Road and road between the Lyre River bridge and parking lot. There would be some additional noise associated with the ongoing use and maintenance of the expanded trail	Under Alt 4 there would be short term noise increase due to construction of new trail in the Sol Duc area and the widening of the existing SRRT, and also during the development of new trail between the Lyre River bridge and parking lot and paving of the Water Line Road in the park. There would be some additional noise associated with the ongoing use and maintenance of the expanded trail system.
Scenery and Visual Resources	The Olympic Peninsula is renowned for its natural beauty and high quality visual resources. Some impacts have occurred due to development and land use practices, particularly in areas used for commercial activities and commodity production. Lake Crescent is a premier destination for those seeking scenic beauty. Shoreline development has occurred in the past on park and private lands, but a high overall visual quality remains.	The existing high level of scenic beauty and visual resources would continue to exist. There would be some ongoing impacts from adjacent land uses that adversely affect visual resources. There would be some short-term visual impacts associated with routine maintenance and repairs to existing infrastructure on park and private lands.	Future use and development may result in adverse visual impacts, particularly if forested lands that are visible from the Lake Crescent area are cleared or developed. Existing short-term impacts associated with routine use, maintenance and repairs would continue.	Under Alt 2 there would be additional short-term impacts associated with construction of new trail and the expansion of existing trail and parking lots. There would be no long-term adverse effects other than those associated with routine use, maintenance and repairs.	Under Alt 3 there would be greater short-term impacts associated with construction of new trail and the expansion of existing trail and parking lots. There would be no long-term adverse effects other than those associated with routine use, maintenance and repairs.	Under Alt 4 there would be greater short-term impacts associated with construction of new trail and the expansion of existing trail and parking lots. There would be some long-term adverse effects due to the extent of vegetation removal needed to construct an accessible trail grade in Segment D of the SRRT. There would be some long-term effects associated with routine use, maintenance and repairs.

Park Operations and Safety	Olympic National Park is managed to provide for employee and visitor safety in accordance with all applicable laws and policies. The park operation has grown over time as new infrastructure has been developed to support increased visitor use.	The existing park operations would continue, as would the NPS commitment to visitor and employee safety.	Park budgets are not expected to increase in the foreseeable future, and may decrease for some operations. The commitment to safety would remain. The general extent of park infrastructure would remain the same.	Under Alt 2, in addition to the existing infrastructure and park operations, new trail would be built in the Sol Duc area, and the existing SRRT and associated parking lots would be expanded. This would result in increased operational demands to maintain the expanded infrastructure and provide for visitor and employee safety in a way that protects park resources and values.	Under Alt 3, in addition to the existing infrastructure and park operations, new trail would be built in the Sol Duc area, and the existing SRRT and associated parking lots would be expanded and paved. The Water Line Road, SRRT parking lot and North Shore Picnic Area parking lot would also be paved. The two historic railroad tunnels would be opened and developed for trail use. This would result in increased operational demands to maintain the expanded infrastructure and provide for visitor and employee safety in a way that protects park resources and values. Support for new trail development on the SRRT may reduce the availability of park staff to maintain other areas.	Under Alt 4, in addition to the existing infrastructure and park operations, new trail would be built in the Sol Duc area, and the existing SRRT would be expanded and paved. The Water Line Road would also be paved. The two historic railroad tunnels would be opened and developed for trail use. This would result in increased operational demands to maintain the expanded infrastructure and provide for visitor and employee safety in a way that protects park resources and values. Support for new trail development on the SRRT may reduce the availability of park staff to maintain other areas.
Land Use	Olympic National Park was established in 1938, resulting in a change in land use within most of the park boundary. Some private lands have been acquired by the NPS within the park boundary. Some private lands remain within the park boundary. The existing SRRT was constructed on park lands, but resulted in a small amount of trail on the corner of one privately held parcel. A General Management Plan was developed for Olympic National Park that guides land use and expansion of the park boundary.	No changes in land use would occur under the No Action Alternative other than what is approved in the OLYM GMP.	Designation of wilderness may occur on the north shore of Lake Crescent, but outside of the SRRT project area. Other current land uses would continue.	Under Alt 2 existing land uses would continue in accordance with the GMP.	Under Alt 3 existing land uses would continue in accordance with the GMP, but the SRRT would be re-aligned to avoid the corner of private property.	Under Alt 4 existing land uses would continue, but some proposed new trail is proposed on private lands. An agreement with the private landowner would be required prior to moving forward with trail development as proposed.

Socioeconomics	The local economy includes numerous elements, including tourism, commodity production, provision of services, and retail operations. Government at the federal, state, and local levels also contribute to the local economy.	Under the No Action Alternative, the existing socioeconomic conditions would continue in relation to activities taken by the NPS. Tourism and the ongoing maintenance and operations of the park would continue to support socioeconomic values.	Improvements to park concession operations and the expansion of the visitor opportunities at Hurricane Ridge may result in benefits to local socioeconomic values. Implementation of the Elwha Dam removal project would also support the local and regional economy.	Under Alt 2 the existing socioeconomic values would be somewhat improved by the expanded trail opportunities. There would be some short-term adverse effects due to closures and delays during trail construction. The estimated cost to implement Alt 2 is \$632,000.	Under Alt 3 the existing socioeconomic values would be improved by the expanded trail opportunities, including better connection to regional trail systems. There would be some short-term adverse effects due to closures and delays during trail construction. The estimated cost to implement Alt 3 is \$4.5 million dollars.	Under Alt 4 the existing socioeconomic values would be improved by the expanded trail opportunities, including better connection to regional trail systems. There would be some short-term adverse effects due to closures and delays during trail construction. The estimated cost to implement Alt 4 is \$4.1 million dollars.
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