National Park Service
U.S. Department of the Interior

Kenai Fjords National Park
Alaska

Finding of No Significant Impact

Herman Leirer (Exit Glacier) Road Flood Mitigation

Environmental Assessment

August 2015

Recommended: _____ 8/26/15
Superintendent, Kenai Fjords National Park — Date

Approved: _____ 8/26/15
Regional Director, Alaska — Date

FINDING OF NO SIGNIFICANT IMPACT

Herman Leirer (Exit Glacier) Road Flood Mitigation
Kenai Fjords National Park, Alaska
August 2015

The National Park Service (NPS) prepared an environmental assessment (EA) evaluating a project in cooperation with the Federal Highway Administration (FHWA) for road improvements to mitigate flooding over the Herman Leirer (Exit Glacier) Road in Kenai Fjords National Park in Seward, Alaska.

The National Park Service has selected Alternative B, **Raise the Road and Install Culverts,** with the mitigation measures. Under Alternative B, a segment of the park road to Exit Glacier that currently experiences routine flooding will be raised five feet, four box culverts will be installed, and the currently existing 2,200 feet of concrete jersey barriers located along the road will be removed. The raised road profile will start approximately 180 feet west of the Resurrection River Bridge, extend beyond the area of highest flood risk, and continue as needed for transitioning the grade, all totaled to be approximately 5,400 feet (about one mile) west of the bridge.

Four public comments were received and all mentioned improving the bike/pedestrian trail beyond what was described in the EA as a widened three-foot road shoulder. Three of the four comments specifically mentioned having a separated trail for bikes and pedestrians instead of a three-foot road shoulder, with two of those people referring to the Herman Leirer Multi-Modal Trail feasibility project from 2013. The fourth comment mentioned adding a "decent bike path along oneside, not just slightly wider shoulders." One of the four public comments also emphasized the roadside stream and adjacent wetlands for bird habitat as well as being concerned about moose movement.

ALTERNATIVES

The following two alternatives were evaluated in the EA.

Alternative A, *Existing Conditions* *(No Action Alternative)*
Under the *No Action* alternative, the 2,200 feet jersey barrier wall along the south edge of the road would be maintained as the primary flood mitigation solution. Vehicular use of the road would continue to be prohibited when water depths on the road exceed six inches.

Alternative B, *Raise the Road and Install Culverts* *(NPS Preferred) (Environmentally Preferable Alternative)*
Under Alternative B, the segment of the Herman Leirer Road in the park that currently experiences routine flooding would be raised five feet and four culverts would be installed. The 2,200 feet of jersey barriers would be removed and salvaged. The footprint of the road would increase from the slope of the road, but the 12 foot driving lanes would not be widened. All the increase in the road footprint would occur on the north side of the road, and the centerline would

shift approximately 12 feet north of the existing centerline, in order to reduce impacts to the south side of the road. Approximately 25 feet of vegetation along the entire length of the project would be removed from the north side of the road. New precast concrete box culverts would be installed to improve drainage at four locations with culvert openings measuring five feet tall and six feet wide each.

A three feet wide paved shoulder added to each side of the road for the length of the one-mile project would allow for bicycle use but is not wide enough to be considered official bicycle lanes and therefore would not be marked as an official bicycle lane. A single white line would separate the 12 feet wide driving lane from the three feet wide shoulder. The project would be completed within one calendar year.

Table 1: Summary Description of Alternatives

Characteristics	Alternative A: No Action	Selected Action: Alt. B
Road rise	None	Five feet
Centerline shift	None	12 feet north
Culverts	Four two feet diameter pipes	Four six feet wide x five feet high boxes
Flows under the road	Six feet wide total	24 feet wide total
Jersey barriers	2,200 feet wall remains	Removed and salvaged
Side slope	Existing	Gentle 2 horizontal:1vertical
Slope treatments	Maintain existing rip rap and spurs on south side	Maintain existing rip rap and spurs on south side, and add rip rap above existing
Driving lane paved width	12 feet each side	12 feet each side
Paved shoulder	One foot each side	Three feet each side
Bicycle lane	No designated bicycle lane, One foot paved shoulder available.	No designated bicycle lane, Three feet paved shoulder available
Treatment length	2,200 feet existing jersey barrier wall	5,400 feet (about one mile) raised road
Road flood frequency	One to three feet per year	None
Vehicular access to Exit Glacier visitor use area	Closure at six inches flood depth over road	No high-water closures
Road surface height above surrounding terrain	About two feet	About seven feet
Traffic delays during construction	None	Normally < 10 min delay, plus some nighttime closures < eight hours for culvert installation
Road damage from erosion	Continuing with each flood	Mitigated to none
New disturbance	None	3.0 to 3.4 acres
Total footprint	3.4 acres existing	6.4 to 6.8 acres
Additional fill	None	37,000 to 42,000 cubic yards

Characteristics	Alternative A: No Action	Selected Action: Alt. B
Cost estimate, initial net construction	$828,000 (cost of completed interim measures)	$3,622,251
Cost estimate, annual maintenance	$12,000	$19,500
Cost estimate, life cycle (50 years annualized)	$78,000	$186,000

Other Alternatives Considered and Dismissed
The above two alternatives were formerly evaluated in the EA. However, four other alternatives were considered in a Value Analyses workshop conducted in September 2014, but were eliminated from this EA as a result of completing the VA. These four rejected alternatives were described in the EA under "Alternatives Considered and Dismissed" and were:

a) Raising the road profile six feet and installing four 100 feet long bridges.
b) Raising the road profile five feet without use of bridges or culverts.
c) Maintaining existing road profile and installing 2,000 feet of log debris wall along edge of active channel of Exit Creek.
d) Maintaining the existing road profile and install 3,850 feet of improved jersey barriers along the road's south edge.

PUBLIC INVOLVEMENT

The EA was issued for public review and comment from July 17, 2015 to August 17, 2015. The public comment period from the onset was opened for the required 30 day period. Notices of the availability of the EA were sent by mail or email to government agencies, tribal entities, interest groups and individuals. The EA was posted on NPS Planning, Environment and Public Comment (PEPC) website at http://parkplanning.nps.gov/. The park issued a press release about the availability of the EA and the open comment period on July 21, 2015 and the press release was also posted on the park's website at www.nps.gov/kefj/. Four written comments were received. All the comments supported the project, but had concerns with the unofficial three-foot bicycle/pedestrian shoulder. One comment emphasized wildlife habitat for bird and moose movements.

The public comments received did not change the conclusions in the EA about the environmental effects of the action. The NPS responses to all comments are found in Attachment A.

DECISION

The NPS decision is to select **Alternative B*, Raise the Road and Install Culverts***, along with the mitigating measures. Additional diagrams are located below in Figures 1-4.

Mitigating Measures
The following mitigation measures apply to the selected alternative, **Alternative B*, Raise the Road and Install Culverts.***

Wildlife (including Fish)
-There will be no tree or brush cutting during nesting season, May 1 – July 15, to comply with the Migratory Bird Treaty Act.

Vegetation
-To avoid introducing invasive plant species, certified weed-free fill will be used.
-All equipment will be pressure washed and thoroughly cleaned prior to arriving on the park.
-Seeding, if done, will use only locally collected, weed free, native seed.
-The park will permanently monitor the project area and treat any non-native plant populations identified.

Soils and Hydrology
-To avoid the introduction of sediment into adjacent wetlands during construction, silt fencing and other appropriate erosion control measures will be used.

Cultural Resources:
-If any historic or archeological objects are discovered during excavation, the project activities in that area will stop, the NPS archeologist will be notified, and the site will be evaluated. Depending on the nature of the historic objects, the project may be delayed while a documentation and recovery is conducted, in consultation with the State Historic Preservation Officer, in order to comply with Section 106, 36 CFR Part 800 of the National Historic Preservation Act of 1966. The park superintendent will decide if and when the project activities could continue.

Visitor Experience and Opportunity:
-Construction traffic delays will be minimized and access to the Exit Glacier visitor use area will be maintained throughout the entire construction operation. The project will generally keep at least one traffic lane open, with delays of up to 10 minutes per hour.
-During installation of the cement box culverts, however, traffic delays will be longer. Box culverts can likely be placed with two to four hour road closures. These longer closures will be announced and posted in advance, and will only occur during nighttime hours (10:00 p.m. to 6:00 a.m.). These traffic closures will eliminate the need for temporary construction bypass routes.
-The project will be completed within one calendar year.
-To prevent night sky impacts, any construction lighting will be directed to the work area and shielded from shining upwards.
-To prevent fugitive dust during construction, dust will be controlled by watering and covering loads.

Rationale for the Decision
The selected alternative (**Alternative B, *Raise the Road and Install Culverts*)** will satisfy the purposes and need of the project better than the no action alternative. By raising the road and installing culverts, this project provides essential access to a primary park destination; eliminates the danger to drivers in traversing flooded roadways; reduces financial loss by commercial users due to road closures from flooding; and eliminates the repetitive cost of repair associated with

damage caused by flood events. In addition to better maintaining summer vehicular access to the Exit Glacier visitor use area, the culverts will allow for more water flow to occur across the floodplain currently restricted by the road.

Alternative A, *No Action*, would not accomplish the purpose and need of the project. Since the jersey barriers were placed in 2012, Herman Leirer Road, the only road to access the popular Exit Glacier area with trails and interpretive facilities, has needed to be closed on a number of occasions due to flooding. This has prevented visitors and commercial users from being able to access the Exit Glacier area. The October 2012 interim measures on the road will also not protect against a predicted stream avulsion event (a stream avulsion is the rapid change of a river channel and the formation of a new river channel).

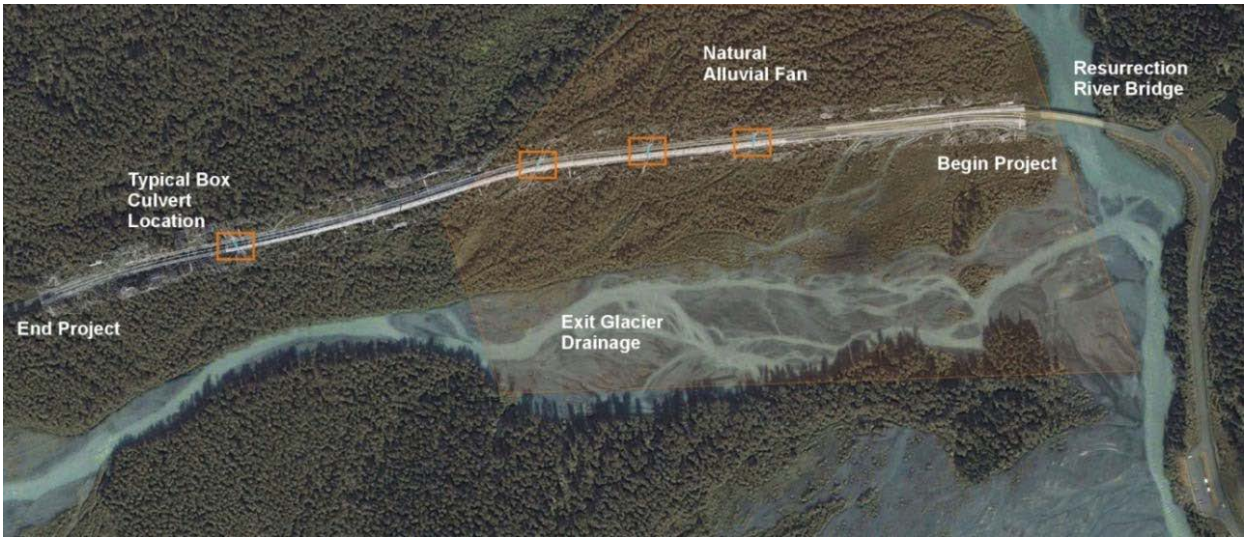

Figure 1. Aerial view of Alternative B: Road Raised Five Feet with Four Box Culverts

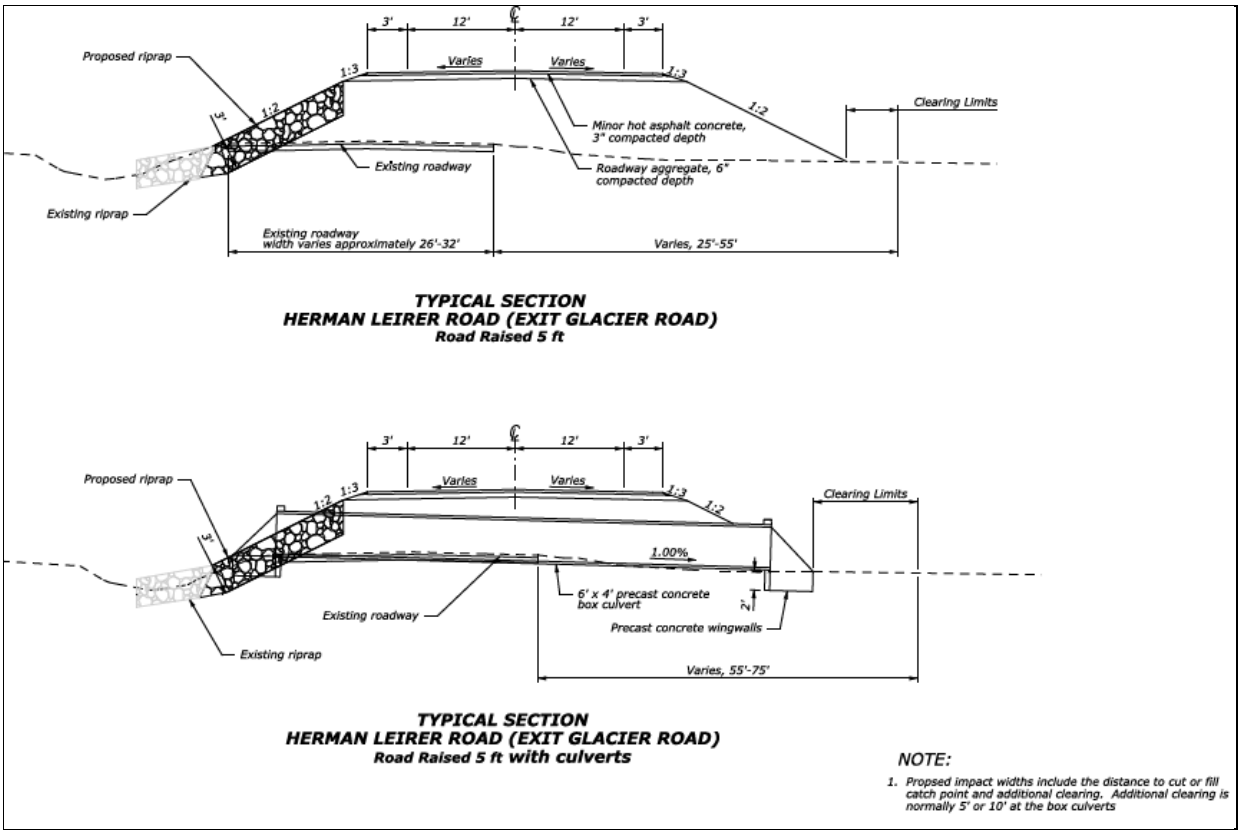

Figure 2. Typical section depicting five feet road raise

Figure 3. Typical six feet wide x five feet tall precast box culvert, cement wing walls, no guardrail

Figure 4. Typical six feet wide x five feet tall precast box culvert, stone wing walls, no guardrail

Significance Criteria

The selected alternative, ***Raise the Road and Install Culverts,*** will not have a significant effect on the human environment. This conclusion is based on the following examination the significance criteria defined in 40 CFR Section 1508.27.

(1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

The EA evaluated the effects of Alternative B, ***Raise the Road and Install Culverts,*** on wildlife and wildlife habitat, vegetation, soils, floodplains, wetlands, and visitor use and safety. As documented in the EA, Alternative B with mitigation measures will have a minor adverse impact on wildlife habitat and wildlife, fish habitat, vegetation, soil, some wetlands. Minor beneficial effects will also occur for anadromous fish habitat, floodplains, and other wetlands as the natural hydraulic regime will be improved over the Exit Creek alluvial fan with the additional waters flowing through the culverts. There will be new moderate beneficial effects to visitor use and safety with no closures and vehicular access to the Exit Glacier area.

(2) The degree to which the proposed action affects public health or safety.

The selected alternative will have a beneficial effect on public health and safety because the project will prevent flooding of the road that can cause road damage and will prevent road closures.

(3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetland, wild and scenic rivers, or ecologically critical areas.

The road project occurs on the only road accessing Kenai Fjords National Park and the Exit Glacier area and is therefore a key visitor access point. The road is located in the Exit Glacier Developed Area and is not located in eligible wilderness. There were no historic or cultural resources found in the project area. A minor amount of non-unique wildlife habitat, vegetation, and soils is involved with the project activities. Floodplains and wetlands are located in the

project area, but the increased water flow through the culverts are expected to improve floodplain function and other wetlands north of the project area.

(4) The degree to which effects on the quality of the human environment are likely to be highly controversial.
Based on previous public scoping and the comments received on the EA, the effects presented in the EA are not controversial. All four letters did not oppose the project, but emphasized adding a separate bicycle lane to the project. One of the four letters specifically supported the project.

(5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
The environmental effects of the selected alternative (Alternative B***, Raise the Road and Install Culverts***) do not involve unique or unknown risks. The mitigations will minimize risks to the public and wildlife populations.

(6) The degree to which the action may establish a precedent of future actions with significant effects or represents a decision in principle about a future consideration.
Improving a road to prevent flooding and road closure is not uncommon, especially when it is the sole transportation access to a popular location. The road construction, while widening the road prism, will still be based on the existing road corridor.

(7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.
This project should provide a 50-year solution to the flooding issue that has affected the only access road to Exit Glacier facilities. The road project will continue to allow access for tens of thousands of visitors to reach their park.

(8) Degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.
The park has determined "No Historic Properties Affected" in its Section 106 compliance review for the proposal and has received concurrence from the State Historic Preservation Officer.

(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.
The selected alternative will not adversely affect an endangered, threatened or proposed species or its critical habitat.

(10)Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.
The selected alternative, ***Raise the Road and Install Culverts,*** will not violate any Federal, State, or local law. An Army Corps of Engineer's Section 404 permit has been submitted for this project.

FINDINGS

The selected alternative complies with the NPS Organic Act (see Attachment B for nonimpairment determination), ANILCA, the Endangered Species Act, the National Historic Preservation Act, and Executive Orders 11988 (floodplains) and 11990 (wetlands). There will be no restriction of subsistence activities as no subsistence activities are allowed in the Exit Glacier area.

The NPS has determined that the selected alternative does not constitute a major federal action significantly affecting the quality of the human environment. Therefore, in accordance with the National Environmental Policy Act of 1969 and regulations of the Council on Environmental Quality (40 CFR 1508.9), an environmental impact statement is not needed and will not be prepared for this project.

ATTACHMENT A

NPS RESPONSES TO PUBLIC COMMENTS AND ERRATA on the Environmental Assessment for Herman Leirer (Exit Glacier) Road Flood Mitigation

Kenai Fjords National Park

In response to the environmental assessment, the NPS received four comment letters. Described below are the substantive comments and the NPS responses. There were no amendments to the subject environmental assessment (EA) for errors.

PUBLIC COMMENTS

Four public comments were received during the review period. All four comments specifically mentioned a bike trail. No comments were against the project.

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1. Comment # 1. Four individuals. Suggest having a separated bicycle/pedestrian trail or larger bike lane instead of the three-foot shoulder to make it safer for bikers and pedestrians along the road.

NPS Response #1: The 2013 Herman Leirer Multi-Modal Trail Feasibility EA did include a separated bicycle/pedestrian trail. However, this flood mitigation project does not extend the entire distance from the bridge to the parking lot. There is approximately another 0.5 miles that extend beyond the newly raised road and the parking lot.

The safety concern was that even if a separated trail was created along the project area, the trail would then end before reaching the Exit Glacier parking lot and thereby force trail users to travel on the roadway. The separated trail in the project area could increase the number of bikers and pedestrians using that trail, which could result in increasing the number of bikers and pedestrian using the existing narrow roadway outside of the project area heading toward the Exit Glacier parking lot. NPS felt that this increased number of bikers and pedestrians could create an unsafe situation along the road between the project area and the Exit Glacier parking lot.

Instead, NPS prefers to continue to pursue a different (currently unfunded) project for the separated bicycle/pedestrian trail that would create a bicycle/pedestrian trail along the entire length of the road from the bridge to the parking lot.

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2. Comment # 2. One individual. Is concerned that not creating a separated bicycle/pedestrian trail during this project will jeopardize future chances of having a bicycle/pedestrian trail.

NPS Response #2: We understand that there is public support to have a trail along the entire roadside between the bridge (where NPS property starts) to the Exit Glacier parking area. However, please see NPS response #1 to see as to why a trail along the length of this project will lead to a more unsafe situation than currently exists. We will continue to collaborate on a bicycle/pedestrian trail along the length of Herman Leirer Road, both within and outside the park.

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3. Comment # 3. One individual. Is concerned about ability of moose to be able to cross this elevated roadway and culverts.

NPS Response #3: This summer, NPS staff saw adult moose tracks showing that they were able to walk over the current existing concrete jersey barriers. NPS expects that the raised road will likely improve the current situation due to the existence of a gentle slope instead of the concrete jersey barriers, which will facilitate both adult moose and calves to cross the road. We do not expect that the moose will enter the culverts, but they should be able to cross the sloped road.

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4. Comment # 4. One individual. Emphasized the value of riparian habitat along the roadside stream and adjacent wetlands to birds.

NPS Response #4: By conducting vegetation clearing activities outside of May 1- July 15, the project will avoid impact to breeding birds. By allowing increased water flow through the culverts, it is expected that wetlands north of the road will increase and may provide additional riparian habitat for birds.

ERRATA

No errata were found in this document, asides from minor typographical errors that did not significantly change the analyses or content of the EA.

ATTACHMENT B

NON-IMPAIRMENT DETERMINATION
for the
Herman Leirer (Exit Glacier) Road Flood Mitigation

in Kenai Fjords National Park

The NPS Organic Act of 1916 and the General Authorities Act of 1970 prohibit impairment of park resources and values. The 2006 NPS Management Policies use the terms "resources and values" to mean the full spectrum of tangible and intangible attributes for which the park is established and managed, including the Organic Act's fundamental purpose and any additional purposes as stated in the park's establishing legislation. The impairment of park resources and values may not be allowed unless directly and specifically provided by statute. The primary responsibility of the NPS is to ensure that park resources and values will continue to exist in an unimpaired condition that will allow people to have present and future opportunities for enjoyment of them.

A determination of impairment is made for each of the resource impact topics carried forward and analyzed in the Herman Leirer (Exit Glacier) Road Flood Mitigation environmental assessment for the selected alternative (Alternative B, *Raise the Road and Install Culverts).* The description of park significance in Chapter 1 and other documents such as the park's enabling legislation were used as a basis for determining if a resource is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- identified as a goal in the park's general management plan or other relevant NPS planning documents.

Impairment determinations are not provided for Visitor Use and Safety because impairment determinations relate back to park resources and values. This impact area is not considered to be park resources or values subject to the non-impairment standard.

Wildlife and Habitat

Under Alternative B, there will be minor impact to wildlife habitat with the loss of 3.0 to 3.4 acres. However, many of the Exit Glacier area facilities were constructed to increase visitation to the Exit Glacier Area and may have already impacted certain wildlife species, such as brown bears, wolves, wolverine, and lynx that have large home ranges and a low tolerance for human disturbance. New direct impacts will be north of the existing road and will be permanent in duration. The vegetation clearing will result in bird displacement but mitigation measures for this project stipulate that there will be no tree or brush cutting during nesting season, May 1 to July 15, to comply with the Migratory Bird Treaty Act. Anadromous fish habitat will not be significantly impacted and the natural hydraulic regime will improve over the Exit Creek alluvial fan with additional waters moving through the culverts. Furthermore, wildlife and habitat

potentially affected by the proposed project are not rare in the project area or in vicinity of the park, and impacts from this project will not result in impairment.

Vegetation
Alternative B will result in direct loss of vegetation due to road building impacting an additional 3.0 to 3.4 acres from the disturbed area from the current road prism. Removed vegetation will be deciduous forest, evergreen forest, mixed forest, and shrub/scrub vegetation along the approximate one mile project area. The native vegetation will be replaced with road fill and asphalt, but these vegetation types are abundant in the surrounding area. There will be an increased potential for the introduction or spread of non-native plant species. As a mitigation measure, fill will be required to be weed free, and the park will permanently monitor the project area and treat any non-native plant populations identified. Mitigation measures will also stipulate that disturbed areas will be revegetated with local native plant species. Indirect beneficial impacts to vegetation will occur from the improvement of the hydrologic regime that adds flood waters to the north side of the road over the Exit Creek alluvial fan, allowing for more natural soil development. The overall impacts will be long-term minor and both adverse and beneficial, but will not result in impairment.

Soils
Alternative B will increase the footprint of development by about 3.0 to 3.4 acres. The park road currently acts as an artificial barrier to natural flow of flood waters over the north portion of the Exit Creek alluvial fan. Alternative B will improve the situation somewhat by providing more flow through four box culverts. This will improve natural deposition and soil development on both sides of the road. Impacts to soil will be permanent under the roadbed, and will be long-term and varied over the alluvial fan. Since most of the one mile project area will still lack culverts, the road will continue to function as a barrier to most soil transport and will thereby impact soil deposition and development on both sides of the road. This will be a long-term minor impact providing some beneficial transport near the culverts to continuing some adverse impacts from soil movement restriction along the rest of the raised road. The soil resource is considered common in context, as it is not identified in the enabling legislation for the park and is not considered rare in the project area or the park vicinity; impacts from this alternative will not cause impairment.

Floodplains
Alternative B will have some adverse, direct, long-term impact to floodplains since it will increase road's footprint by about 3.0 to 3.4 acres, which will contribute slightly to runoff and increased flooding potential. This alternative will also have beneficial impact to floodplains since it will increase the flood flows under the road, from six to 24 linear feet with box culvert openings. This alternative will help to restore the natural function of the floodplain where the road crosses the Exit Creek alluvial fan. The duration of impacts will be long-term adverse and beneficial, and will not cause impairment.

Wetlands
Alternative B will result in some adverse, direct, long-term new impact to 2.46 acres of freshwater forested/shrub wetland due to road fill. The project will also result in beneficial, long-term new impact to wetlands by rewetting and restoring former wetlands north of the road,

and improving natural function of the alluvial fan. The freshwater forested/shrub wetland resource is considered common in context, as it is not identified in the enabling legislation for the park and is not considered rare in the project area or the park vicinity. While the direct impact of road fill will cause minor adverse effects to 2.46 acres of wetlands, it is expected that there will be minor beneficial effects to wetlands north of the road. The overall impacts from this alternative will not result in impairment.

Cultural Resources
The State Historic Preservation Officer has concurred that "No Historic Properties Affected" in the project area for the National Historic Preservation Act Section 106 compliance review for the proposal. The impacts from this alternative will not result in impairment.

SUMMARY

The level of impacts to wildlife and habitat, vegetation, soils, floodplains, wetlands, and cultural resources from implementing Alternative B, *Raise the Road and Install Culverts,* will not result in an impairment of park resources that fulfill specific purposes identified in the establishing legislation or that are key to the integrity of the park.

ATTACHMENT C

STATEMENT OF FINDINGS FOR WETLANDS AND FLOODPLAINS
for the
Herman Leirer (Exit Glacier) Road Flood Mitigation
Environmental Assessment

for Kenai Fjords National Park

APPENDIX

STATEMENT OF FINDINGS

For Executive Order 11990 (Protection of Wetlands)
and
For Executive Order 11988 (Floodplain Management)

Herman Leirer Road (Exit Glacier Road) Flood Mitigation Project
Kenai Fjords National Park, Alaska

July 2015

Recommended:

Superintendent, Kenai Fjords National Park — Date: 8/26/15

Certified for Technical Accuracy and Servicewide Consistency:

Chief, Water Resources Division, Washington Office — Date: 8/26/2015

Approved:

Regional Director, Alaska Region — Date: 8/28/15

Introduction

The National Park Service (NPS) is considering road improvements to mitigate flooding over the Herman Leirer Road (Exit Glacier Road) in Kenai Fjords National Park in Seward, Alaska. The road would be raised five feet and four large box culverts would be installed to allow floodwaters to pass. Construction is proposed for 2016. Road improvements would be completed on the Herman Leirer Road, also known as the Exit Glacier Road, Alaska Forest Highway Route 46, and the Resurrection River Road.

The purpose of the project is to maintain summer vehicular access to the Exit Glacier visitor use area, which includes an interpretive center, trails, parking lot, restrooms, and campground. The Exit Glacier area is the park's most popular and only road-accessible visitor area. An average of 48,840 visitors use the road during the months of May through September (average from 2010-2014; park statistics from www.irma.nps.gov).

The nine mile, dead-end Herman Leirer Road was first bulldozed as a gravel road from 1971-1980 by a private individual, Herman Leirer. It traverses the Resurrection River floodplain, wetlands, and wildlife habitat in the alluvial fan of Exit Creek. Bridge #1390, across the well-defined Resurrection River, was constructed in 1985 by NPS at mile 7.3 of the Herman Leirer Road as it enters the park. The portion of the road in the alluvial fan was engineered, paved, and widened from 1998-2001 by NPS.

The proposed road project is on the alluvial fan of Exit Creek near the confluence with the Resurrection River. The existing road was been built on the alluvial fan, and portions of Exit Creek occasionally overlap the road. The road flooding is primarily associated with channel change on the alluvial fan. The road acts as a barrier to natural flows over the alluvial fan and has changed the natural hydrology to the north. Impacts include road closures during peak tourist season and costly repairs to road damage. To restore a more natural flow of Exit Creek across its alluvial fan, the project would install four large culverts (five feet high and six feet wide each) and raise the road five feet to accommodate aggradation over time.

The size and locations of the new box are designed to match existing flood channels that were well defined on both the south and north sides of the road. The box culverts primary purpose would be to convey water to the channels north of the road to maintain the existing and relic flood scour channel habitat. The box culverts would convey a larger amount of water than the existing pipe culverts. The existing pipe culverts pass some water. The larger flow is intended to enhance the current habitat. The proposed box culverts will pass more water and be easier to maintain as the sediment levels fluctuate. Culvert size (six feet span and five feet rise) was designed primarily as minimums to what is needed for cleaning access and for accommodating some sediment transport at the inlet. The culvert spans also approximately match the flood channel widths. The box culverts are not designed to convey the entire flow from Exit Creek and Paradise Creek. Excess flow, not conveyed through the culverts, would be conveyed along the south side ditch to the Resurrection River. If the entire flow from the two creeks were to combine and flow against the road, the road embankment would redirect the flow east to the Resurrection River. A new large channel would be created paralleling the road. The road embankment would be adequately armored to prevent major damage to the road.

Flooding over the road is variable but occurs about twice a year and has caused damage along the road edge. The road is closed to vehicles if the flow depth over the road reaches six inches because that level has been shown to obscure painted road lines and could lead to vehicles driving off the roadway.

Executive Order 11990 (Protection of Wetlands) and Executive Order 11988 (Floodplain Management) require the NPS, and other federal agencies, to evaluate the likely impacts of actions in wetlands and floodplains. The executive order requires that short and long-term adverse impacts associated with occupancy, modification or destruction of wetlands and floodplains be avoided whenever possible. Indirect support of development and new construction in such areas should also be avoided wherever there is a practicable alternative.

To comply with these executive orders, the NPS has developed a set of agency policies and procedures which can be found in Director's Order 77-1 and Procedural Manual 77-1 for Wetland Protection, and in Director's Order 77-2 and Procedural Manual 77-2 for Floodplain Management. The policies and procedures related to wetlands and floodplains emphasize: exploring all practical alternatives to building on, or otherwise affecting, wetlands and floodplains; reducing impacts to wetlands and floodplains whenever possible; mitigating impacts from building in floodplains, and providing direct compensation for any unavoidable wetland impact by restoring degraded or destroyed wetlands on other NPS properties.

The purpose of this Statement of Findings (SOF) is to present the NPS rationale for its proposed road work in the floodplain and wetland area. This SOF also documents the anticipated effects on these resources.

A. FLOODPLAINS

Justification for Use of the Floodplain

The road is the only vehicular access to the Exit Glacier visitor use area of the park, which is the most visited part of the park with a 5-year average of 48,840 visitors using the road during the months of May through September. Preliminary scoping limited the project to the existing road alignment (across the alluvial fan). The option to move the road off of the floodplain was considered but rejected because the relocation and construction of a new bridge over the Resurrection River would be impractical.

Exit Glacier infrastructure including the Nature Center and trails are also located in the alluvial fan upstream and out of the current flooding zone. Relocating these structures is not an option either due to extensive visitor use at Exit Glacier and the road is necessary to access these structures.

Site Specific Flood Risk

The flooding interval is irregular. The following table shows the instances of flooding of Exit Glacier Road since 1995. The frequency of these events has increased substantially since 2009.

Dates of Documented Road Flooding			
July	August	September	October
7/29/09	8/16/10	9/20/95	10/9/06
7/8/10	8/3/11	9/18/08	10/2/10
7/17/11	8/12/13	9/8/11	
	8/29/13	9/19/12	
	8/13/14	9/6/13	
		9/14/14	

The flood depths are not great – less than two feet over the road – and the velocities are not hazardous enough to threaten to wash away cars from the roadway. The hazard occurs when depths exceed six inches and drivers cannot see the pavement striping on the road and cannot tell where the road edge is. In such cases, drivers might accidently drive off the road and into the ditch. Therefore, the current way of dealing with road flooding is to close the road when depth reaches six inches or greater.

The time required for flooding to occur is extremely variable. Typically, the water depth adjacent to the road is observed, and when it reaches the surface of the road, warnings and constant observation follows.

It is very possible for visitors or staff to be cut off by the road flooding for several hours. The road is a dead end, and it terminates beyond the flood hazard area in a developed area with a parking area, campground, visitor center, restrooms, trail to the glacier, and overnight hiking trails. There is no food service or visitor lodging at the road end.

With the current road configuration there is opportunity for a significant safety or visitor delay situation to develop. If floodwaters rise relatively quickly – within two hours – to the point where NPS rangers close the road for safety, then there may be little opportunity to evacuate, especially since many visitors may not be near the visitor center and parking area.

A hydrology and geomorphology study of Exit Creek is underway by Janet Curran of USGS (Anchorage). These data are from her work but are preliminary and not yet published.

The forest floor has been buried in sediment, grading from cobbles near the braid plain to sand near the road. Fluvial structures (swale/ridge topography, streamlined gravel deposits) have begun to develop near the braid plain. Sitka spruce kill was observed in 2013 (suggesting recent flooding or saturated soil around spruce trees); weak green-up of upland deciduous trees was observed in 2014 (suggesting poor soil condition from flooding or saturated soils). Erosion is rare and minor; fresh sediment deposits are nearly ubiquitous throughout flooded forest areas.

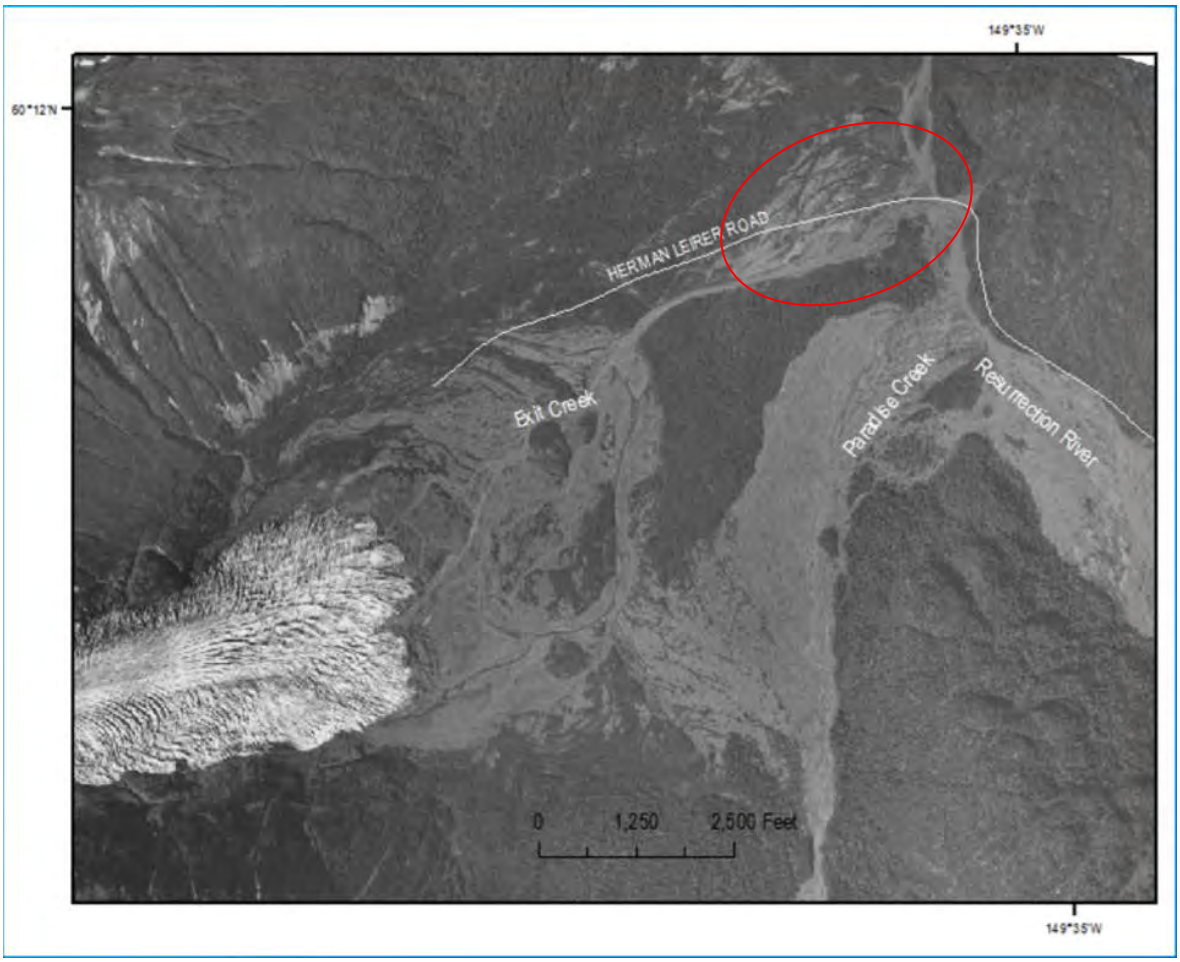
Peak stream flows (floods) in Alaska can be the result of snowmelt, glacier melt, and/or rainfall. Flooding prior to 2009 was less common and occurred late in the year. Records include a 1995 report of one foot of water over the top of the road. Since 2009, the road has flooded one to three times per year. Road floods have occurred in July, August, September, and October. Impacts include road closures during peak tourist season and costly repairs to road damage.

USGS measured Exit Creek discharge at modest non-flood summer flows twice in 2013 – 590 cubic feet per second (cfs) on 23 July 2013 and 460 cfs on 21 August 2013.

There are two main sources of Exit Creek flow – a small stream emerging from the toe of Exit Glacier and a larger flow from a canyon south of the glacier terminus. The Exit Creek channel has changed, recently and historically. The USGS used LIDAR and aerial photos to determine geomorphic setting and history back to 1950. USGS surveyed transects in 2013 to compare to 2011 transects and bank heights to assess potential for overtopping. Basic data and reconnaissance were collected by USGS in 2013, such as grain size data, discharge rates, and field-checking the entire braid plain, including the Paradise Creek crossover area.

The influence of glaciers and Paradise Creek on the Exit valley was considered. Paradise Creek shares the valley with Exit Creek. Exit and Paradise Creeks were compared by USGS. Exit valley has many moraines, while Paradise valley contains few. Paradise Creek is steeper, larger, and coarser than Exit Creek. Both creeks have built alluvial fans at the mouths of their valleys. Paradise Creek has likely flowed into Exit Creek many times in the past. Exit Creek geomorphic reaches include the outwash plain, a section confined by moraines, and a braided section on an alluvial fan. The valley that Exit Creek and Paradise Creek flow into contains a nested suite of moraines and several alluvial fans. Paradise Creek periodically influences the water and sediment budget in Exit Creek. Exit Glacier moraine positions extend far down-valley, however, Paradise Glacier moraines are not an influence in Exit valley. If Paradise Creek were to again flow into Exit Creek, the larger flows might be too large for the proposed project box culverts. However, if and when Paradise Creek will contribute direct flow into Exit Creek is unpredictable, but, potentially could happen. Design of the proposed road addresses this potential impact.

Figure SOF-1 – This 1950 aerial photo illustrates the problem. Flow direction is towards the east into the Resurrection River, then southeast. Note the red circled active alluvial fan of Exit Creek to the right of the word “ROAD.” This is the project area, which is now largely vegetated, where flooding of the road occurs when high flows seek northern channels but are blocked by the road and by inadequate culverts. The proposal is to raise the road and add culverts to allow surface water to transit beneath the road to the north.



Project Design will Mitigate the Current Road Flooding and the Existing Condition of Minimal Hydrologic Flow

The construction of a causeway or bridge across the alluvial floodplain was considered cost prohibitive (about $20M). The project design would raise the road five feet and install four box culverts (five feet high and six feet wide each), which would improve the hydrologic function of the floodplain area at much less cost (about $4M). The new design would allow much more water to flow to the north side of the road (now accommodated by two sets of two 24 inch pipe culverts), and it would improve the natural processes of gravel deposition and channel development.

The location of the four box culverts would match existing, well developed flood channels on both the south and north side of the road. The box culverts primary purpose is to convey flow to the channels north of the road for maintaining habitat. The box culverts would convey a larger amount of water than the existing pipe culverts. The larger flow would enhance the current habitat. Culvert size of the four box culverts (five feet high and six feet wide each) was established primarily as a minimum for what would be needed for cleaning access and for accommodating some sediment deposition at the inlet. The culvert spans would also approximately match the flood channel widths.

The project design would minimize the risk to life and property by preventing road flooding and maintaining unencumbered vehicular access to the Exit Glacier area of the park.

Floodplain Summary

The project would eliminate road flooding and improve natural processes across the project area and beyond to the alluvial fan of Exit Creek.

B. WETLANDS

Wetlands within the Project Area

Wetland boundaries were identified in the field by a 2012 NPS contract to Kenai Watershed Forum and confirmed in the field in 2015 by NPS staff, Paul Burger and Bud Rice.

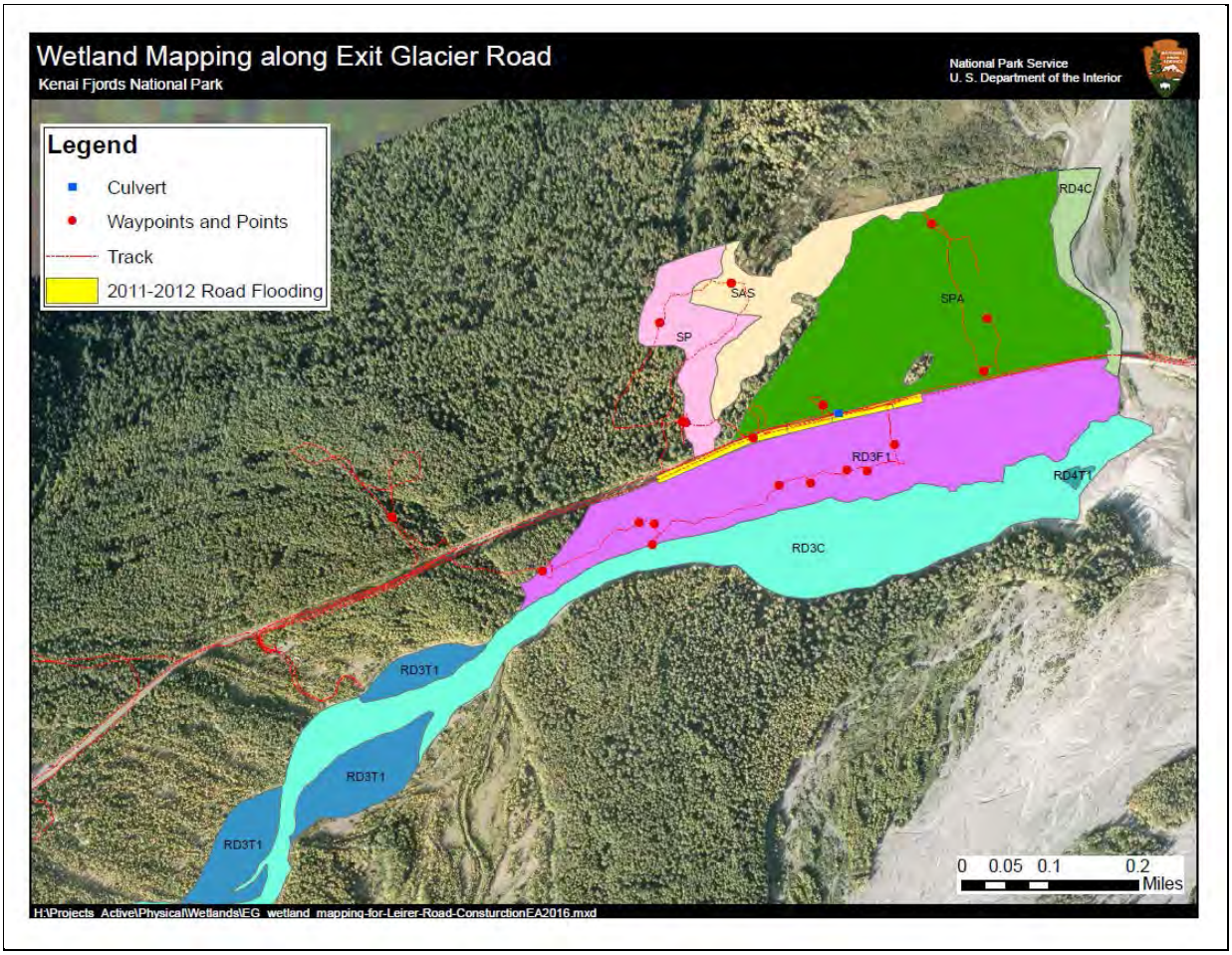


Figure SOF-2 – Wetlands and Road Flooding Area

Wetland Overview

Wetlands around the project area are adjacent to a recent avulsion of a braid-thread of Exit Creek. The stream thread is occupying a new channel on the Exit Creek braid-plain adjacent to

the Herman Leirer Road, causing the road to now flood more frequently. Stream thread avulsion is a common process on braid-plains. During conditions of high flow, larger material is transported in suspension. As the flow subsides, sufficient material drops from suspension to raise the elevation of the bed above that of the surrounding braid-plain. When this occurs, the flow in the stream thread seeks a lower elevation, and may avulse to a new position on the plain. These events are frequent, depending on glacial melt, precipitation, and sediment supply. Retreat and thinning of Exit Glacier has reduced storage capacity of the glacier and exposed more bare ground and more sediment for transport to the Exit Glacier outwash plain and floodplain during high precipitation events. The avulsion of Exit Creek toward the north has apparently raised the surrounding water table, creating expanded areas of wetland in the vicinity of the Herman Leirer Road.

The data collected in the field by Kenai Watershed Forum in 2012 were of two types: wetland determination data, and mapping data. Data forms from the Alaska Regional Supplement to the US Army Corps of Engineers (USACE) wetland delineation manual (2007) were used to record wetland determination data. A number of these points were rechecked by qualified NPS regional wetland delineators (Paul Burger and Bud Rice) on June 30, 2015 who confirmed that the 2012 delineation was still accurate.

The wetland determination data can be used to document the extent to which any site might meet the criteria established by the USACE for consideration as a wetland under their jurisdiction pursuant to section 404 of the Clean Water Act. USDA PLANTS codes for plant names were used instead of binomials. The PLANTS database (http://plants.usda.gov/dl_state.html) contains useful information as synonymy (many plant names have recently changed), authority, and wetland indicator status, and was updated in June 2012.

The following is a summary of the plant cover data with indicator status and Plant Prevalence Index, by Kenai Watershed Forum 2012

WAYPOINT 1
Plant Prevalence Index 3.06

Taxon	Cover	Indicator Status
Alnus incana (L.) Moench ssp. tenuifolia (Nutt.) Breitung	60	FAC
Calamagrostis canadensis (Michx.) Beauv.	6	FAC
Equisetum arvense L.	4	FAC
Salix alaxensis (Anderss.) Coville	4	FAC
Populus balsamifera L.	3	FACU
Picea sitchensis (Bong.) Carr.	2	FACU
Pyrola asarifolia Michx.	1	FAC
Salix barclayi Anderss.	1	FAC
Salix sitchensis Sanson ex Bong.	0.1	FAC
Rubus arcticus L.	0.1	FAC
Carex disperma Dewey	0.1	FACW

WAYPOINT 10
Plant Prevalence Index 3.01

Taxon	Cover	Indicator Status
Alnus incana (L.) Moench ssp. tenuifolia (Nutt.) Breitung	40	FAC
Equisetum arvense L.	30	FAC
Calamagrostis canadensis (Michx.) Beauv.	10	FAC
Salix barclayi Anderss.	5	FAC
Picea sitchensis (Bong.) Carr.	1	FACU
Platanthera obtusata (Banks ex Pursh) Lindl.	0.1	FACW
Athyrium filix-femina (L.) Roth	0.1	FAC
Dryopteris expansa (K. Presl) Fraser-Jenkins & Jermy	0.1	FACU
Rubus arcticus L.	0.1	FAC
Orthilia secunda (L.) House	0.1	FACU

WAYPOINT 5

Plant Prevalence Index 2.98

Taxon	Cover	Indicator Status
Alnus incana (L.) Moench ssp. tenuifolia (Nutt.) Breitung	30	FAC
Salix barclayi Anderss.	20	FAC
Equisetum arvense L.	3	FAC
Carex disperma Dewey	1	FACW
Calamagrostis canadensis (Michx.) Beauv.	1	FAC
Rubus arcticus L.	0.1	FAC
Picea sitchensis (Bong.) Carr.	0.1	FACU
Tsuga mertensiana (Bong.) Carr.	0.1	FAC
Trientalis europaea L.	0.1	FAC
Dryopteris expansa (K. Presl) Fraser-Jenkins & Jermy	0.1	FACU
Parnassia palustris L.	0.1	FACW
Lycopodium annotinum L.	0.1	FAC
Pyrola asarifolia Michx.	0.1	FAC
Carex buxbaumii Wahlenb.	0.1	FACW
Eriophorum angustifolium Honckeny	0.1	OBL

WAYPOINT NEW

Plant Prevalence Index 3.29

Taxon	Cover	Indicator Status
Salix barclayi Anderss.	35	FAC
Alnus incana (L.) Moench ssp. tenuifolia (Nutt.) Breitung	25	FAC
Populus balsamifera L.	25	FACU
Salix sitchensis Sanson ex Bong.	3	FAC
Picea sitchensis (Bong.) Carr.	2	FACU
Salix alaxensis (Anderss.) Coville	1	FAC
Calamagrostis canadensis (Michx.) Beauv.	0.1	FAC
Equisetum arvense L.	0.1	FAC
Carex buxbaumii Wahlenb.	0.1	FACW
Carex disperma Dewey	0.1	FACW

WAYPOINT WET9

Plant Prevalence Index 3.36

Taxon	Cover	Indicator Status
Alnus incana (L.) Moench ssp. tenuifolia (Nutt.) Breitung	70	FAC
Equisetum arvense L.	30	FAC
Populus balsamifera L.	30	FACU
Pyrola chlorantha Sw.	30	FACU
Calamagrostis canadensis (Michx.) Beauv.	4	FAC
Oplopanax horridus Miq.	1	FAC
Trientalis europaea L.	1	FAC
Orthilia secunda (L.) House	0.1	FACU
Streptopus amplexifolius (L.) DC.	0.1	FAC
Chamerion angustifolium (L.) Holub	0.1	FACU
Galium triflorum Michx.	0.1	FACU
Athyrium filix-femina (L.) Roth	0.1	FAC
Actaea rubra (Ait.) Willd.	0.1	FAC
Platanthera obtusata (Banks ex Pursh) Lindl.	0.1	FACW
Viburnum edule (Michx.) Raf.	0.1	FACU

The 2012 effort mapped 171.2 acres of wetland in the 420.3 acre Exit Glacier Development Area. This is 40% of the area mapped but covers 100% of the project area. The areas mapped as RD3T1, RD3T2 and RD4T1 may not currently meet the jurisdictional criteria developed by the USACE; however, due to the extremely dynamic nature of braid-plains in the Seward area they probably will meet those criteria at some time during the next few decades. In fact, much of the other wetland area would have been mapped as these types before the recent avulsion of Exit Creek. Additionally, the areas mapped as river channel (RD4C and RD3C) are not strictly wetland, because they are un-vegetated. However, the area mapped as SPA, SAS and SP is wetland, although the areas mapped as SPA and SP probably were not wetland before the recent change in Exit Creek. The area mapped as SAS probably has been wetland since deglaciation.

The chemistry data help document the processes responsible for driving the functions of the wetlands mapped. Two hypotheses are possible: one is that the wetlands are supported directly by hyporheic flow (the flow of the river through the porewater of the sediments in the braid-plain). The other is that river flow is hydraulically damming groundwater discharging to these sediments. It can be difficult to determine which process dominates, but in this area the strong contrast in chemistry between the water in Exit Creek (and the Resurrection River) and the surface and local groundwater supports rejection of the first hypothesis.

Specific conductance (SC) was measured of: 1) Exit Creek, 2) the Resurrection River, 3) clear water creeks flowing through the area, 4) in the surface, and 5) pore waters of the wetlands themselves. Specific conductance is related to the overall concentration of ions in the water and can provide a hint to the source of different waters if a strong contrast is present. The SC of Exit Creek was measured at five points and averages 50 µS/cm, and was also low in the Resurrection River (85.7 µS/cm) compared to the other sources where SC is much higher. A clear water creek at the base of the adjacent mountain slope had a value of 188.2 µS/cm; the average value found in streams flowing through the area was 220 µS/cm; wetland surface water averaged 226.5 µS/cm; and wetland pore water averaged 331.3 µS/cm.

This pattern of the difference in SC was especially evident at one location where clear water flowed into the turbid water of Exit Creek in a ditch along the Herman Leirer Road. There, the clear water had a SC of 237.9 µS/cm, and the turbid water of Exit Creek had a SC value of 60.9 µS/cm only 10 meters downstream (see figure below). This strong contrast in a short distance downstream implies that shallow groundwater with high SC is being hydraulically dammed by the flow of Exit Creek which supports a low SC.

Figure SOF-3 – Clear groundwater (foreground), which has discharged into a ditch, flows into the turbid water of Exit Creek at the center of the picture on 18 July 2012. The source of the clear groundwater may be either Exit Creek filtered through the sediments of the braid-plain, or local groundwater discharging from recharge in surrounding mountain slopes. The SC measured in the clear water was much higher (237.9 µS/cm) than that of Exit Creek (60.9 µS/cm) just 10 meters away, indicating that the clear water is not Exit Creek water filtered by hyporheic flow through the braid-plain sediments. – Kenai Watershed Forum 2012.

Prior to avulsing, Exit Creek was further south, allowing a broader area for dispersal of local groundwater on the north side of the creek. Because the shallow groundwater could disperse over a broader area, it was deeper, supporting fewer wetlands. Therefore, the avulsion of Exit Creek has probably led to an increase in wetland area near the road due to hydraulic damming of local groundwater rather than because creek water is infiltrating through the hyporheic zone.

The wetlands located within the proposed project area consist mostly of wooded riverine bottomlands. The immediate floodplain surrounding the streambed is classified as Riverine Upper Perennial Unconsolidated Cobble-Gravel/Vegetated (R3US). These wetlands provide poor habitat for macro-invertebrates and few fish, including very low numbers of Dolly Varden and small mammals such as voles. Moose and snowshoe hare frequent the area. Black bear are fairly common in this area, while brown bear are seen much less frequently. A number of migratory and resident bird species use these wetland and floodplain areas for breeding and foraging.

No threatened or endangered animal or plant species are found in the area.

Numerous similar glacial river systems are found in the area and region within and outside the park. The wetland acreage adversely impacted by the project, 2.46 acres, is a relatively minor part of the alluvial fan and the numerous local small stream valleys nearby.

The beneficial impacts to wetlands, from reestablishing natural surface water flows over the Exit Creek alluvial fan north of the road, are a significant improvement to the existing situation. Removing the wetlands under the road fill would have no impact on any known cultural resources, and would have a minor adverse impact on surface water quality, including sediment control and water purification, flood flow, and animal and macro-invertebrate habitat.

NPS Policy is to avoid siting projects in wetlands whenever possible. If circumstances make it impracticable to avoid wetlands, then mitigation of unavoidable impacts must be planned. A NPS wetlands no-net-loss policy requires that wetland losses be compensated for by restoration of wetlands, preferably of comparable wetland type and function and in the same watershed, if possible. Restoring the surface water flows to the north of the Exit Glacier Road is expected to create a new wetland area of about 10 acres immediately north of the road and west of the mapped wetlands. It may also increase the wetland area to 15 to 20 acres by pushing more water through the box culverts onto the north side and flooding areas currently upland. This action would also increase the function of degraded wetlands now partially starved of natural water flows to the north of the road.

Alternatives Considered

A series of project alternatives were considered over the years by the park, the public, and a value analysis workshop including Federal Highway Administration and USGS representation.

- Moving the road out of the Exit Creek alluvial fan was considered impractical as it would require a new bridge over Resurrection River and a new road alignment through currently undisturbed uplands.
- Elevating the road on a raised bridge or causeway was considered impractical due to the cost (about $20M).
- Raising the road profile six feet and installing four 100-feet long bridges, was determined to be too expensive ($8.8M).
- Maintain the existing road profile and install a 2,000 feet long log debris wall along the edge of the active channel, was determined to be only a short-term solution and too speculative as to effectiveness ($1.7M). The log debris wall would need to be replaced in 20 to 25 years.
- Maintain the existing road profile and install a 3,850 feet improved jersey barrier along the road's south edge, was determined to be too speculative as to effectiveness, and added no benefit to the degraded wetlands and floodplains on the north side of the road ($4.9M). Such a flood wall would allow about two feet or flood depth above the road surface to be diverted to the Resurrection River. The aesthetic impacts would be significant.

The selected alternative is a combination of raising the roadway five feet and adding four large box culverts (five feet tall by six feet wide each) to relieve flood water and to return functionality of the floodplain and degraded wetlands on the north side of the road.

Summary of Wetland Impacts Proposed Compensation

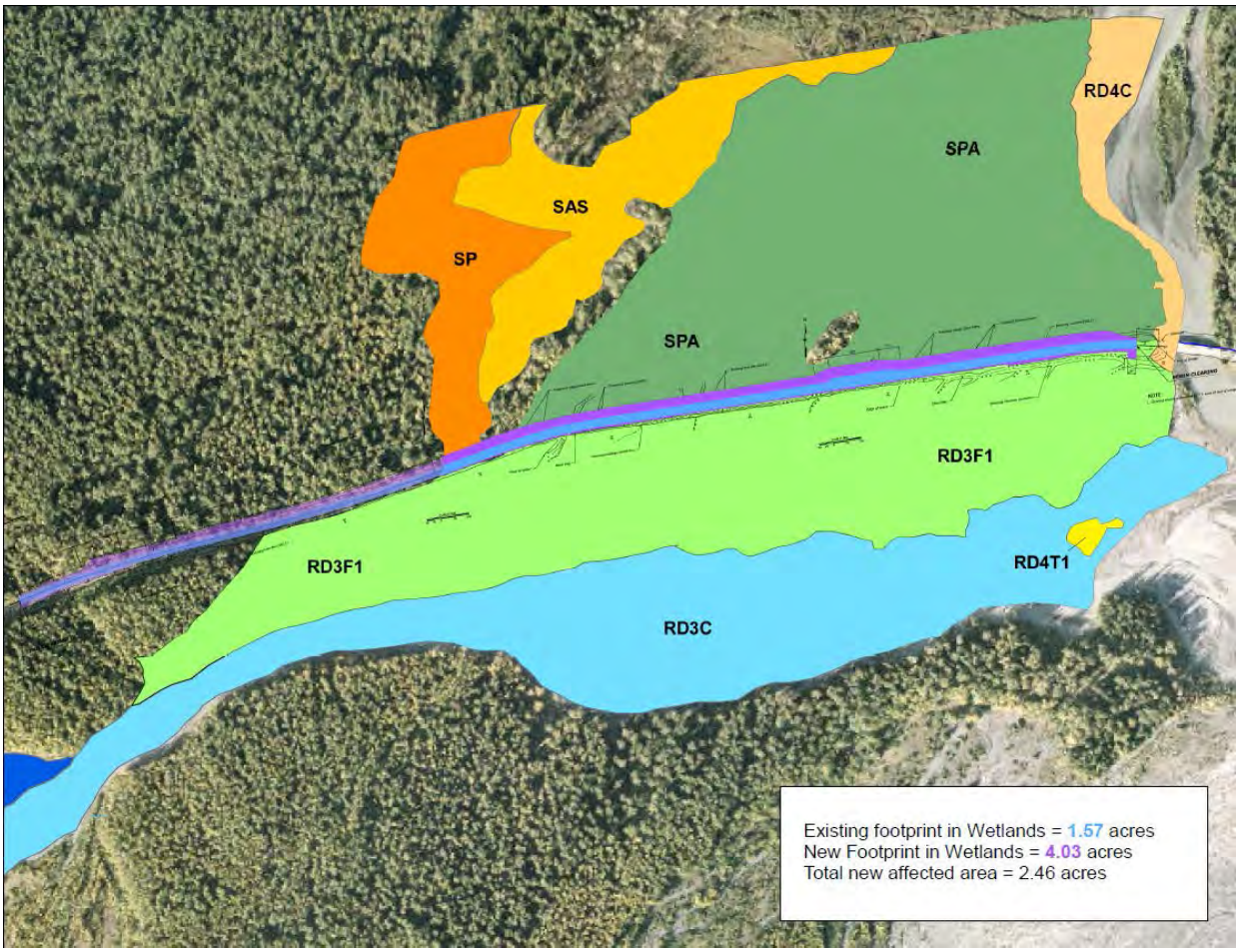


Fig SOF-4 – Wetlands and Impact Acreage

The entire project area is in the Exit Creek alluvial fan. The proposal is a road improvement project one mile long through an area with increasingly frequent flooding. The existing road footprint in wetlands is 1.57 acres. The proposed new fill in wetlands would be 2.46 acres, due to raising the roadway 5 feet which would require increasing the width of the road base prism. The new wetlands footprint (existing plus the new fill) would be 4.03 acres.

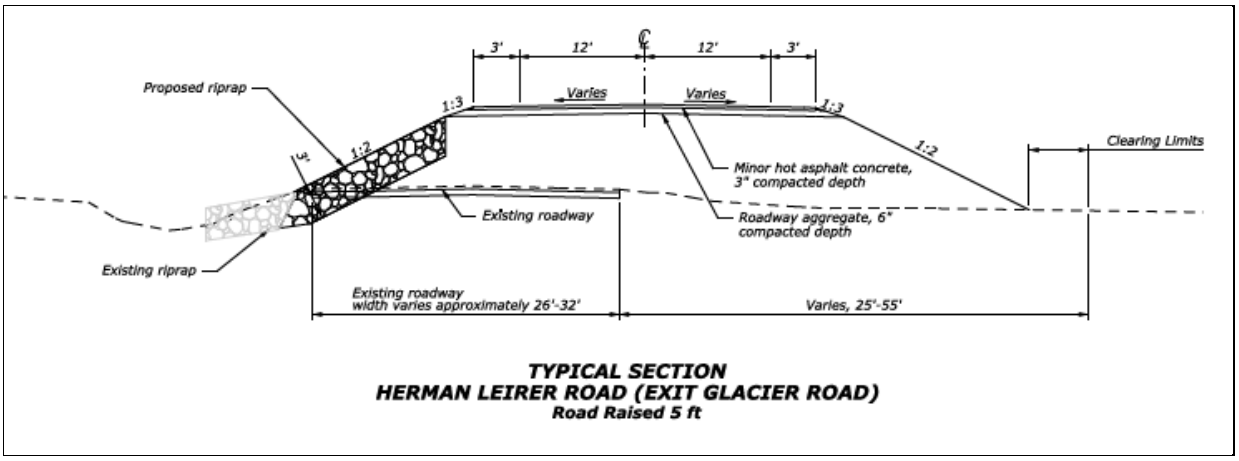


Fig SOF-5 – Typical section depicting five feet road raise.

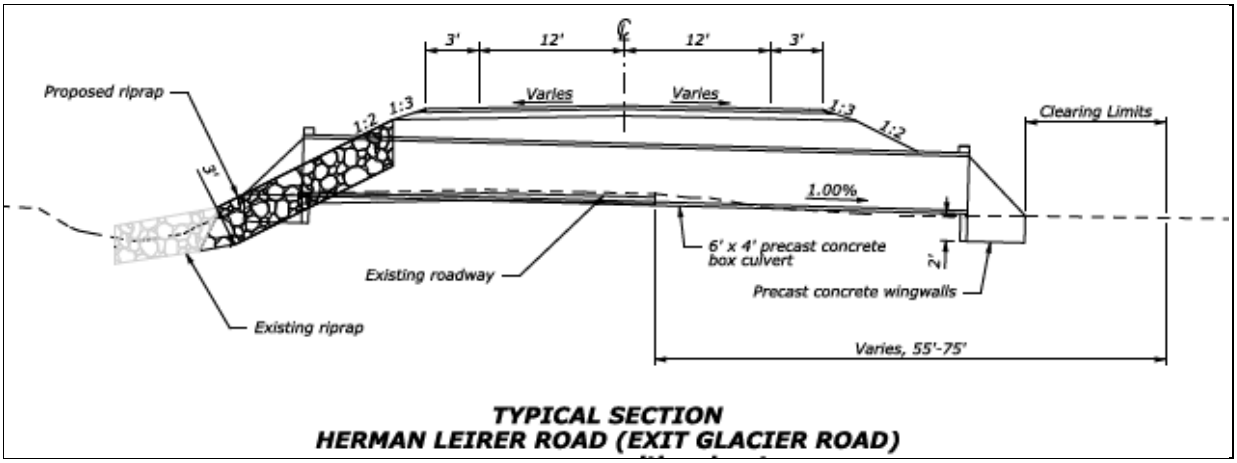


Fig SOF-6 – Typical section depicting box culvert.

A purpose of the project is to reestablish more-natural surface water flow regimes north of the road. Currently, the road forms an artificial barrier to surface flows over the alluvial fan to the north. The four existing drainage 24 inch pipe culverts are inadequate and overwhelmed during flood events, and wetlands north of the road have been degraded and diminished by this road barrier. The proposed box culverts would significantly improve the hydrologic transfer of surface water flow past the road prism. Approximately 80 acres of wetlands north of the road would be benefit from the improved hydrologic transfer, and up to 20 acres of wetland may be created as a result of the improved surface water transfer to the north of the road.

The new box culverts may serve a minor role in preventing flooding but they do not seem to be absolutely essential for the primary purpose of the project which is to maintain road access to the Exit Glacier area. This suggests that they are proposed for the primary purpose of restoring some hydrologic function to the area north of the road. Therefore, the hydrologic effect of these culverts could serve to compensate for the functional loss of the wetlands filled by the road expansion (2.46 acres).

The project benefits to the hydrology of the about 80 acres of wetlands north of the road are far greater than the adverse impacts created by the fill of 2.46 acres of wetland and therefore compensate for the impacts of the proposed fill.

Conclusion

The NPS concludes that there are no practicable alternatives to filling 2.46 acres of wetlands for the flood mitigation work on the Herman Leirer Road. Wetlands would be avoided to the maximum practicable extent. The wetland impacts that could not be avoided would be minimized. The braided stream's macro-invertebrate habitat and wetland vegetation habitat would be improved by the four large box culverts allowing improved stream flow to the north side alluvial fan. The NPS acknowledges that some natural as well as artificial localized wetlands processes would be adversely affected by the increased roadbed footprint. Impacts on the wetlands would be more than compensated by restoring natural riverine and palustrine wetland habitat and associated riparian habitat on the Exit Creek alluvial fan north of the road. The NPS finds that this project is consistent with Procedural Manuals #77-1 and #77-2 *Wetland Protectio*n, 2011 and *Floodplain Management*, and compliant with NPS Director's Order #s77-1 and 77-2, *Wetland Protection and Floodplain Management*.

--end--