Lowell Creek Flood Diversion Feasibility Study

404(b)(1) Evaluation
Seward, Alaska

September 2020

US Army Corps
of Engineers®
Alaska District

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Prepared By:

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1.0 PROJECT DESCRIPTION

1.1 Location

The Lowell Creek Flood Diversion System is located in Seward, Alaska. Congress authorized the Lowell Creek tunnel in 1937, and construction was completed by the U.S. Army Corps of Engineers (USACE) in 1940. The existing project consists of four parts: a diversion dam with emergency spillway, the intake transition, the tunnel, and the outlet transition. It reroutes Lowell Creek through Bear Mountain and bypasses the City of Seward to Resurrection Bay (Figure 1). The City of Seward, with a population of 2,663 in 2016, lies immediately downstream of the flood diversion system near the head of Resurrection Bay on the Kenai Peninsula, approximately 125 miles south of Anchorage by the highway.

1.2 General Description

The Lowell Creek drainage basin comprises a 4.1-square-mile area within the Kenai Mountain range, which lies along the south-central coast of Alaska. The community of Seward averages 71.8 inches of annual precipitation that peaks in September at 10.4 inches. Elevation varies within the Lowell Creek basin from 300 feet at the diversion tunnel entrance to 4,000-foot mountain peaks. Lowell Creek's gradient above the diversion structure is approximately 1,000 feet per mile and exhibits no defined pools or slack areas of surface water. There are no tributaries to Lowell Creek; however, very steep mountain drainage slopes indicate nearly sheet flow over solid rock into the mainstream (ACOE 1978). Historical water quality measurements for this site are exceedingly sparse, with only one formal measurement on record in the USGS database (USGS 1992). Lowell Creek produces significant debris during flood conditions, once generating an estimated 10,000 cubic yards of debris in an 11-hour timeframe (Stauffer 2010). The Lowell Creek alluvium is a prominent land feature in Resurrection Bay, and the creek's current depositional potential is apparent at the diversion discharge site where the new alluvium protrudes into the bay.

Significant portions of Seward's modern infrastructure are built upon the Lowell Creek alluvium. Jefferson Avenue currently exists in Lowell Creek's historic channel. The successful diversion of Lowell Creek in 1940 has played a quintessential role in providing stability required to conduct long-term city planning and infrastructure improvements in Seward. The USACE is unable at this time to calculate the long-term beneficial impact that the implementation of the Lowell Creek diversion and tunnel has had on the population and infrastructure of Seward.

The purpose of USACE's project is to improve flood diversion capacity at Lowell Creek. The existing flood diversion system in Lowell Canyon does not adequately manage flood events and presents a risk to life, property, and critical infrastructure with little to no warning.

The tunnel inlet at Bear Mountain is capable of transporting relatively low flows (up to 2800 cfs) through the system and is prone to blockages from upstream debris. Either a higher flow event or tunnel blockage would lead to flows going immediately into downtown Seward. In addition, the tunnel outlet is prone to the accumulation of debris and sediments at the Lowell Point Road Bridge. During some of the floods of record, the bridge has been damaged, destroyed, and/or buried under as much as 20 feet of debris. This has led not only to the isolation of Lowell Point to the south but also to damage critical infrastructure in south Seward.

1.3 Authority and Purpose

This GI study was authorized by Section 5032 of the Water Resources Development Act (WRDA) of 2007. Section 5032(a) of WRDA 2007 directs the Secretary (Assistant Secretary of the Army, Civil Works (ASACW)) to assume responsibility for the long-term maintenance and repair of the Lowell Creek tunnel until November 2022, or until an alternative method of flood diversion is constructed and operational, whichever is earlier.

Sections 5032(b) and (c) of WRDA 2007 direct the Secretary to conduct a study to determine whether an alternative method of flood diversion in Lowell Canyon is feasible. Subsequently, if the Secretary determines that an alternative method of flood diversion in Lowell Canyon is feasible, then the Secretary shall carry out the alternative method.

Overall, USACE's GI study objectives are to develop alternatives that reduce risk to public health, life, and safety from the flooding of Lowell Creek to the City of Seward; reduce flood damages to property and critical infrastructure; reduce the cost of emergency response and management, and reduce operation and maintenance costs.

1.4 General Description of Dredged or Fill Material

The USACE's proposed project would create a new, larger, rolled concrete diversion dam approximately 100 meters upstream of the existing diversion system. The diversion dam would route Lowell Creek's surface flows and bedload (approximately 25,000 cubic yards of material per year) through a newly hewn, increased diameter, concrete-lined tunnel in Bear Mountain, and discharge them via pier supported elevated concrete flume over Lowell Point Road to the existing alluvium that has accreted as a result of Lowell Creek's original diversion system.

1.4.1 General Characteristics of Material (grain size, soil type)

Other than the concrete utilized in the construction of each of the individual project elements, the material transported by Lowell Creek is almost entirely comprised of mechanically weathered greywacke, which is the dominant geological composition of the watershed. Grain size is variable and is generally characterized as boulders, cobbles, pebbles, and coarse sands.

1.4.2 Quantity of Material (CY)

The exact quantity of material required for the construction of the diversion dam will be determined by physical modeling yet to be completed.

The annual quantity of material that passes through the existing diversion structure and is directed towards Resurrection Bay is approximately 25,000 cubic yards (cy).

1.4.3 Source of Material

Concrete resources required for the construction of the diversion dam, tunnel lining, and outfall flume would be sourced locally to the greatest extent possible.

The source of Lowell Creek's bedload is the steep, talus-strewn mountainous terrain that defines its small watershed. All material is native to the Lowell Creek watershed; there are no anthropogenic structures or otherwise above the existing diversion system.

1.5 Description of Proposed Discharge Site

The new diversion dam would acutely span the width of Lowell Creek at a point just upstream of the existing diversion system.

Discharge of the Lowell Creek surface waters and bedload would occur on the seaward side of Lowell Point Road, approximately 200-feet south of the existing outfall. Lowell Creek's current bedload discharge is so much that mechanical management of the sediment is required to prevent rerouting of the surface waters and the flooding of portions of south Seward. Manipulation of sediments is achieved by excavators and large bulldozers, often working in the water while Lowell Creek is actively discharging. Sediments in the active channel are cleared and are pushed to the extent of the ever-growing alluvium. This high level of disturbance precludes any vegetation establishment in the discharge area.

It is not uncommon for flood events to deposit enough sediment to completely cover the Lowell Point Road Bridge, which spans the discharge surface waters of Lowell Creek during normal conditions and serves as the single land access route to Lowell Point. In an effort to alleviate this recurring condition, USACE's project design includes the installation of a pier supported 150' elevated concrete flume that would direct the entirety of Lowell Creek's discharge to a point on the alluvium past Lowell Point Road.

1.5.1 Location

Lowell Creek is located immediately west of Seward, Alaska. The existing project's diversion dam is located just upstream of Seward, surface waters, and bedload are routed through Bear Mountain and discharge to Resurrection Bay via concrete flume.

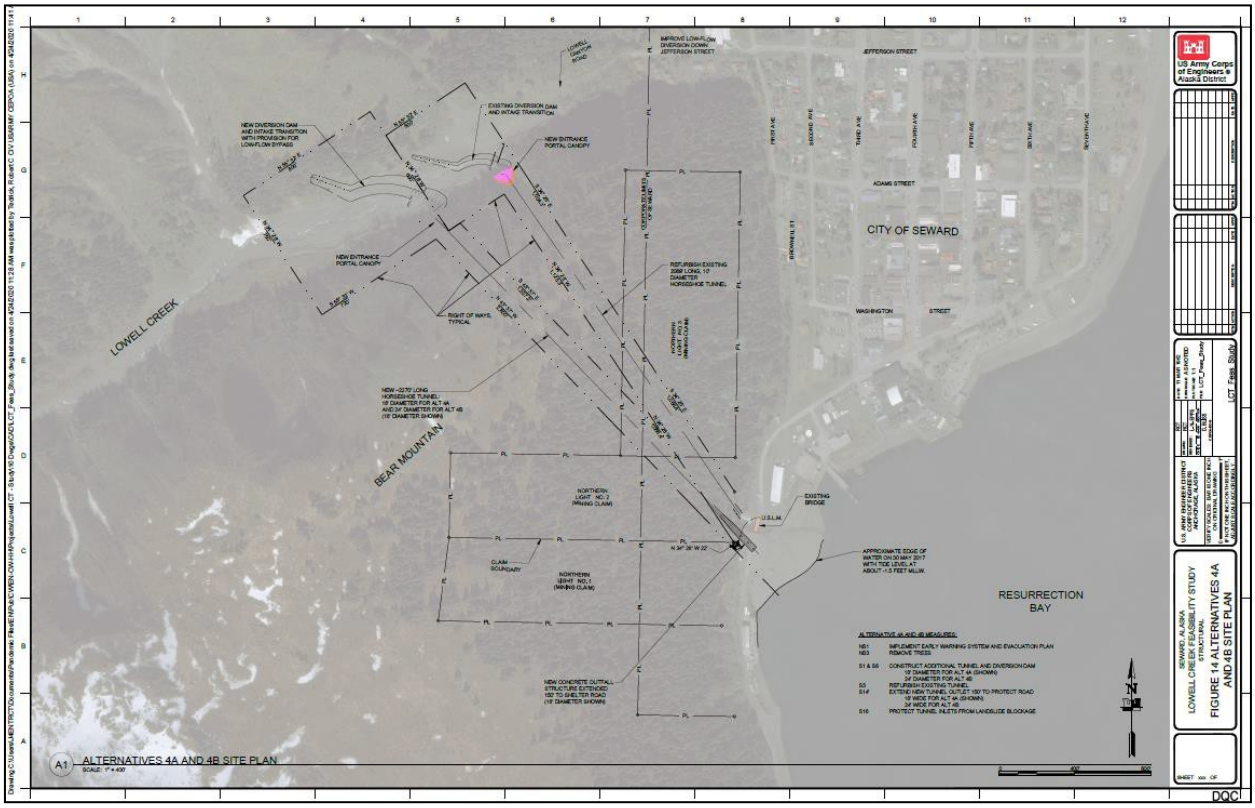

Figure 1. Project location

1.5.2 Size

The operational footprint of the diversion structure and tunnel entrance would be less than 1 acre. The footprint of the outfall flume would be less than 1 acre.

1.5.3 Type of Site

The vicinity where the diversion dam and tunnel entrance is proposed is characterized by the National Wetlands Inventory (NWI) mapping tool as R3UBH: Riverine, Upper Perennial, Unconsolidated Bottom, and Permanently Flooded.

The discharge site on land and is the existing Lowell Creek alluvium.

Figure 2. Lowell Creek. Immediately upstream of the existing diversion structure

1.5.4 Types of Habitat

Vegetation characteristics for the Lowell Creek watershed are little different than previously described in 1978: “approximately 30% of the upland drainage exhibits vegetative cover, and is comprised of low growing alders, small shrubs, and isolated patches of scrub conifers” (ACOE 1978). Vegetation does not occur upon the steeper portions of the surrounding slopes. It is limited to an area of transitional slope between creek bankfull and the boundary of the bare rock/scree zone that constitutes the majority of the watershed. The area of the proposed diversion dam structure is primarily comprised of a heterogeneous mix of boulders, cobbles, and gravel that is largely devoid of established vegetation (Figure 1).

The area beneath the tunnel discharge flume to the point where Lowell Creek’s surface waters meet Resurrection Bay is completely devoid of vegetation. Discharge velocities and debris deposition in this section are sufficient to preclude vegetation establishment.

1.5.5 Timing and Duration of Discharge

Construction of the new diversion dam, tunnel, and elevated outfall flume would take multiple years to complete. Work conducted within the stream channel itself would only occur during the lowest flow period of Lowell Creek’s hydrograph, i.e., the winter months. This is because the work could not be safely conducted during the rest of the year because of the scouring flows that typify the Lowell Creek hydrologic activity.

1.6 Description of Disposal Methodology

Construction of the new dam diversion, tunnel, and elevated outfall flume would abide by industry standards for construction methodology. Construction would be expected to last a year and would employ an in-stream diversion to route Lowell Creek's surface waters around active construction and through the existing tunnel system.

Sediments discharged to the alluvium by Lowell Creek's natural hydrologic processes would still have to be managed by the same method currently employed to prevent sediment build-up and flooding in south Seward. Bulldozers and excavators would work to keep the main channel to Resurrection Bay open by spreading sediments to the edge of the alluvial fan.

2.0 FACTUAL DETERMINATION

2.1 Physical Substrate Determinations

In-channel substrates are a heterogeneous mix of greywacke boulder, cobbles, and gravels. There is very little, if any, established vegetation in Lowell Creek's scoured channel (Figure 2). Substrates at the point of discharge and throughout the alluvial fan are the same as those above the diversion system.

2.1.1 Substrate Elevation and Slope

All elements of the project, as proposed within the Lowell Creek Canyon, would occur between 160 and 240-feet elevation above sea level. Generally, the Lowell Creek watershed exhibits a 1,000-foot elevation change per mile.

2.1.2 Sediment Type

Substrate sediments are almost entirely comprised of mechanically weathered greywacke, which is the dominant geological composition of the watershed.

2.1.3 Dredged/Fill Material Movement

Substrate sediments beneath the diversion dam will not move as a result of the USACE's proposed project. Sediments discharged to the alluvial fan would require recurring manipulation and would continue to expand the existing alluvial fan.

2.1.4 Physical Effects on Benthos

Continuous disturbance along the intertidal and subtidal alluvial margin in the form of burial by clean, homogeneous sediments would occur as a result of USACE's proposed project. However, this would be similar to the existing condition. Lowell Creek's depositional potential would not be affected by the project, and the continued growth of the existing alluvium would be expected.

2.1.5 Other Effects

No other effects are anticipated.

2.1.6 Actions Taken to Minimize Impacts

Seasonal restrictions with regard to in-channel construction actions minimize impacts by reducing the overall risk to human health and equipment. Work would be conducted during winter months during the low flow period of Lowell Creek's hydrograph.

2.2 Water Circulation, Fluctuation, and Salinity Determinations

It is unknown if the continual deposition of Lowell Creek's sediments would affect water circulation in the greater Resurrection Bay, or to what degree this would be detectible.

2.2.1 Water

2.2.1.1 Salinity

Although salinity gradient data collections were not conducted during the feasibility phase of USACE's project, implementation of the project would not be expected to affect existing salinity gradients in Resurrection Bay. It is presumed that because USACE's project does not change the discharge of Lowell Creek into Resurrection Bay, then there would be no effect to the natural baseline.

2.2.2 Water Chemistry

Concrete elements of the diversion system would not affect the baseline water chemistry values of Lowell Creek.

Similarly, it is presumed that because USACE's project does not change the discharge of Lowell Creek into Resurrection Bay, then there would be no effect on the natural baseline.

2.2.2.1 Clarity

Water clarity would not be affected by USACE's proposed project elements because the hardened concrete structures would not be expected to add to or reduce the system's existing sediment load.

Similarly, it is presumed that because USACE's project does not change the discharge of Lowell creek into Resurrection Bay, then there would be no effect on the natural baseline.

2.2.2.2 Color

Water color would not be affected by the USACE's proposed project elements because the hardened concrete structures would not be expected to add to the system's existing sediment load.

Similarly, it is presumed that because USACE's project does not change the discharge of Lowell creek into Resurrection Bay, then there would be no effect on the natural baseline.

2.2.2.3 Odor

Water odor would not be affected by USACE's proposed project elements because the hardened concrete structures would not be expected to add to, or detract from, the system's existing odor profile.

Similarly, it is presumed that because USACE's project does not change the discharge of Lowell creek into Resurrection Bay, then there would be no effect on the natural baseline.

2.2.2.4 Taste

The taste of Lowell Creek's water would not be affected by USACE's proposed project elements because the hardened concrete structures would not be expected to add to, or detract from, the system's existing water's taste.

Similarly, it is presumed that because USACE's project does not change the discharge of Lowell creek into Resurrection Bay, then there would be no effect on the natural baseline.

2.2.2.5 Dissolved Gas Levels

Dissolved gas levels would not be affected by USACE's proposed project elements because the hardened concrete structures would not be expected to add to or detract from the system's existing dissolved gas values.

Similarly, it is presumed that because USACE's project does not change the discharge of Lowell creek into Resurrection Bay, then there would be no effect on the natural baseline.

2.2.2.6 Nutrients

Aqueous nutrient levels would not be affected by USACE's proposed project elements because the hardened concrete structures would not be expected to add to the system's existing sediment load.

Similarly, it is presumed that because USACE's project does not change the discharge of Lowell creek into Resurrection Bay, then there would be no effect on the

natural baseline.

2.2.2.7 Eutrophication

Lowell Creek's propensity for eutrophic conditions would not be affected by USACE's proposed project elements because the hardened concrete structures would be designed to direct flowing surface waters and not impound existing surface flows.

Similarly, it is presumed that because USACE's project does not change the discharge of Lowell creek into Resurrection Bay, then there would be no effect on the natural baseline.

2.2.2.8 Others as Appropriate

N/A

2.2.3 Current Patterns and Circulation

Currently, the entirety of Lowell Creek's surface flow is diverted through Bear Mountain and discharged to Resurrection Bay. USACE's proposed project would not affect the final outcome of Lowell Creek's surface flows as they currently exist. Similarly, the effects to the waters of Resurrection Bay would not change from the existing condition.

2.2.3.1 Current Patterns and Flow

N/A

2.2.3.2 Velocity

N/A

2.2.3.3 Stratification

N/A

2.2.3.4 Hydrologic Regime

N/A

2.2.4 Normal Water Level Fluctuations

N/A

2.2.5 Salinity Gradients

N/A

2.2.6 Actions That Will Be Taken to Minimize Impacts (refer to Subpart H)

N/A

2.3 Suspended Particulate/Turbidity Determinations

N/A

2.3.1 Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site (consider items in sections 230.11(c) and 230.21)

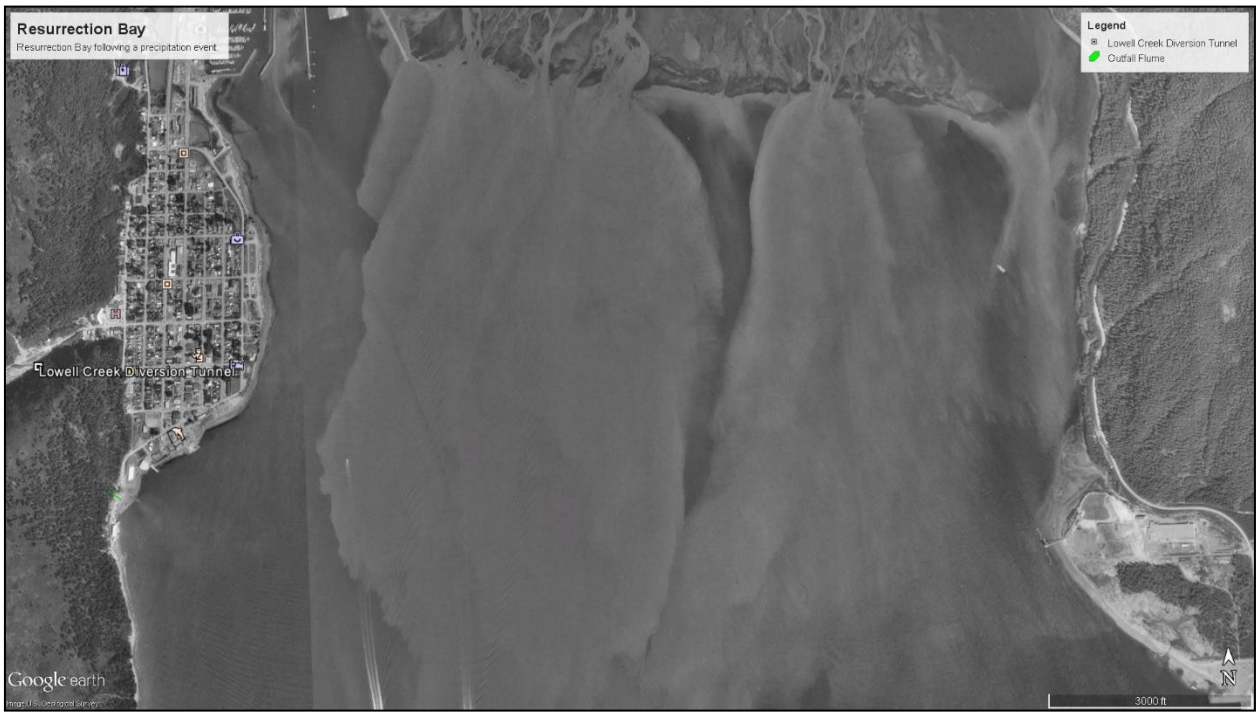

Figure 3. Resurrection Bay following a precipitation event.

Resurrection Bay is a dynamic system that is ringed by mountainous, glacial watersheds; it receives large inputs of sediments that can occlude its waters for hours to days following precipitation events. USACE would not expect its project to alter the existing conditions in the vicinity of the discharge site (Figure 3).

2.3.2 Effects on Chemical and Physical Properties of the Water Column

Implementation of USACE's project, as proposed, would not be expected to affect the chemical or physical properties of the water column of Resurrection Bay because it would not change the discharge of Lowell Creek into Resurrection Bay.

2.3.2.1 Light Penetration

N/A

2.3.2.2 Dissolved Oxygen

N/A

2.3.2.3 Toxic Metals and Organics

N/A

2.3.2.4 Pathogens

N/A

2.3.2.5 Aesthetics

N/A

2.3.2.6 Others as Appropriate

N/A

2.3.3 Effects on Biota

Lowell Creek naturally exhibits a particularly low degree of biological diversity because of the recurring physical scouring of the in-stream sediments. Lowell Creek is completely devoid of fish.

Similarly, it is presumed that because USACE's project does not change the discharge of Lowell creek into Resurrection Bay, then there would be no effect on the biota of Resurrection Bay.

2.3.3.1 Primary Production, Photosynthesis

Implementation of USACE's project, as proposed, would not affect primary

production or photosynthesis in Lowell Creek's surface waters.

Similarly, USACE's project would not affect primary production or photosynthesis in Resurrection Bay because it would not change the discharge of Lowell Creek into Resurrection Bay.

2.3.3.2 Suspension/Filter Feeders

N/A

2.3.3.3 Sight Feeders

N/A

2.3.4 Actions Taken to Minimize Impacts

N/A

2.4 Contaminant Determinations

Concrete elements of USACE's project, as proposed, would be expected to interact with surface waters and sediments in the normal course of their purpose but would not be expected to act as a conduit for contaminant exposure of those waters and sediments.

According to the State of Alaska's Department of Environmental Conservation's contaminated site tracking tool, there are no contaminated sites in the vicinity of Lowell Creek.

2.5 Aquatic Ecosystem and Organism Determinations

Implementation of USACE's project, as proposed, would not affect the scour restricted aquatic ecosystem in Lowell Creek

Similarly, USACE's project would not affect the aquatic ecosystem in Resurrection Bay because it would not change the discharge of Lowell Creek into Resurrection Bay.

2.5.1 Effects to Plankton

No effect.

2.5.2 Effects on Benthos

No effect.

2.5.3 Effects on Nekton

No effect.

2.5.4 Effects on Aquatic Food Web

No effect.

2.5.5 Effects on Special Aquatic Sites

There are no designated Special Aquatic Sites at either the proposed point of diversion or in the vicinity of the outfall discharge.

2.5.5.1 Sanctuaries and Refuges

N/A

2.5.5.2 Wetlands

In-stream placement of a concrete diversion dam in less than an acre of heavily disturbed streambed.

2.5.5.3 Mud Flats

There are no mudflats in the vicinity of the proposed project.

2.5.5.4 Vegetated Shallows

There are no vegetated shallows in the vicinity of the proposed project.

2.5.5.5 Coral Reefs

There are no coral reefs in the vicinity of the proposed project.

2.5.5.6 Riffle and Pool Complexes

Only those riffles and pools that might exist during moderate flow conditions between the proposed project and the existing project would be affected by the implementation of the proposed project. Waters that might support those habitats would be diverted by the new diversion dam. However, because of Lowell Creek's scouring flows, these habitats are likely never permanent in nature and do not support high levels of biodiversity.

2.5.6 Threatened and Endangered Species

The USACE has coordinated with both the U.S. Fish and Wildlife Service and the National Marine Fisheries Service and has determined that its project would result in a no effect determination for threatened or endangered species.

2.5.7 Other Wildlife

Wildlife may be deterred from utilizing some habitats in the lower Lowell Creek

watershed during periods of construction, but this would be minimized by the requirement for wintertime construction.

2.5.8 Actions to Minimize Impacts

Construction efforts would occur during the low flow period of Lowell Creek's hydrograph.

2.6 Proposed Disposal Site Determinations

N/A

2.6.1 Mixing Zone Determination

N/A

2.6.2 Determination of Compliance with Applicable Water Quality Standards

The project, as proposed, complies with all applicable water quality standards.

2.6.3 Potential Effects on Human Use Characteristic

2.6.3.1 Municipal and Private Water Supply

Lowell Creek is not utilized as a municipal or private water supply.

2.6.3.2 Recreational and Commercial Fisheries

Lowell Creek is devoid of fish, and there is no recreational fishery that would be influenced by the implementation of USACE's proposed project. Similarly, Lowell Creek does not support a commercial fishery.

2.6.3.3 Water Related Recreation

There are currently no water related recreation opportunities associated with Lowell Creek. Implementation of USACE's project would not affect the existing condition of water related recreation in Lowell Creek.

2.6.3.4 Aesthetics

Almost the entirety of the existing project is located within Lowell Canyon and inside Bear Mountain and is not visible to the general public or would take significant effort to observe. Also, several safety features such as exclusionary fencing and signage on the crest of the diversion dam have been erected specifically to prevent accidents from people getting too close to the tunnel entrance invert.

However, the point of outfall is readily observable in south Seward and forms a somewhat scenic waterfall feature that naturally attracts attention from tourists and residents alike. Implementation of the elevated flume component of USACE's

project would essentially move this feature across the road.

2.6.3.5 Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves

Implementation of USACE's project, as proposed, would not impact Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, or Similar Preserves.

2.7 Determination of Cumulative Effects on the Aquatic Ecosystem

Cumulative effects resulting from USACE's historical and currently proposed action are limited to those facilitated by the establishment and continued expansion of the alluvium at the point of discharge. Mechanical manipulation of the sediments has been a requirement established by the original project and would be required in perpetuity under the proposed project. The operation of mechanical equipment in the waters of Lowell Creek or Resurrection Bay carries the risk of inadvertent release of environmentally persistent compounds such as fuels, oils, and lubricants. Over time, the risk of inadvertent release of environmentally persistent compounds increases because the avenue for exposure is not alleviated.

2.8 Determination of Secondary Effects on the Aquatic Ecosystem

Secondary effects on the aquatic ecosystem would not be expected as a result of the implementation of USACE's project, as proposed. USACE's project does not change the end result of the existing condition.

3.0 FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

3.1 Adaptation of Section 404(b)(1) Guidelines to this Evaluation

The proposed activity complies with the requirements set forth in the Environmental Protection Agency's Guidelines for the Specification of Disposal Sites for Dredged or Fill Material; there were no adaptations.

3.2 Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem

A suite of seven practical alternatives were analyzed as a method of addressing flood control actions on Lowell Creek, including a no-action alternative. Also, it was determined that no non-structural alternatives, alone or in combination, would have been capable of achieving the goal of reducing flood risk to the community of Seward. However, all alternatives presented below included non-structural components like early warning systems; they are not included in this analysis because they would not

have had an effect upon the aquatic environment of Lowell Creek or Resurrection Bay. Ultimately, each alternative evaluated did not seek to alter the end result of Lowell Creek's full discharge to Resurrection Bay via the ever-growing alluvium.

Alternative 1 was the no-action alternative.

Alternative 2 would have refurbished the existing tunnel and installed a canopy above the tunnel entrance and invert to protect it against blockage from a localized debris slide.

Alternatives 3a and 3b would have enlarged all elements of the existing system, diversion dam, tunnel diameter (3a was 18-foot, and 3b was 24-foot), and 150-foot elevated concrete outfall flume. Ultimately, this alternative was rejected because it would have taken far too long to construct because the structure would have had to of been operational during most of the year.

Alternatives 4a and 4b would construct a new diversion dam, tunnel, and 150-foot elevated concrete outfall flume just upstream of the existing structure. Alternative 4a, the preferred alternative, incorporates an 18-foot diameter tunnel, while Alternative 4b would have incorporated a 24-foot diameter tunnel. Construction of most elements would occur year-round, and the existing diversion system would be used to divert flows around active construction at the project site. Also, the existing diversion system would act as a redundant system should the new system fail or become overwhelmed. Alternative 4a was selected because it provided a greater cost to benefit ratio than Alternative 4b. Similarly, because of its reduced overall tunnel excavation footprint in comparison with Alternative 4b, and with the implementation of environmental conservation measures, the USACE has determined that Alternative 4a represents the least environmentally damaging practical alternative (LEDPA) evaluated under this assessment.

Alternative 5 would have created a 25,000 cy debris basin above the existing diversion structure. Theoretically, this basin would be excavated on an annual basis in the wintertime and would be able to absorb the quantity of material estimated to be currently discharged at the alluvium of the outfall point. This alternative was thought to have the greatest impact to the aquatic environment of all the alternatives.

3.3 Compliance with Applicable State Water Quality Standards

The proposed construction project would not be expected to have an appreciable adverse effect on water supplies, recreation, growth, and propagation of fish, shellfish, and other aquatic life, or wildlife. It would not be expected to introduce petroleum hydrocarbons, radioactive materials, residues, or other pollutants into the waters of the United States.

3.4 Compliance with Applicable Toxic Effluent Standard or Prohibition under Section 307 of the Clean Water Act

No toxic effluents that would affect water quality are associated with the proposed project. Therefore, the project complies with the toxic effluent standards of Section 307 of the Clean Water Act.

3.5 Compliance with the Endangered Species Act of 1973

The USACE's project, as proposed, is compliant with the Endangered Species Act.

3.6 Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972

There are no designated marine sanctuaries in the vicinity of the project site, as proposed.

3.7 Evaluation of the Extent of Degradation of the Waters of the United States

USACE's project, as proposed, would not affect the existing water quality baseline in either Lowell Creek or Resurrection Bay.

3.7.1 Significant Adverse Effects on Human Health and Welfare

3.7.1.1 Municipal and Private Water Supplies

No effect.

3.7.1.2 Recreation and Commercial Fisheries

No effect.

3.7.1.3 Plankton

No effect

3.7.1.4 Fish

No effect.

3.7.1.5 Shellfish

No effect.

3.7.1.6 Wildlife

No effect.

3.7.1.7 Special Aquatic Sites

No effect.

3.7.2 Significant Adverse Effects on Life Stages of Aquatic Life and Other Wildlife Dependent on Aquatic Ecosystems

No effect.

3.7.3 Significant Adverse Effects on Aquatic Ecosystem Diversity, Productivity, and Stability

No effect.

3.7.4 Significant Adverse Effects on Recreational, Aesthetic, and Economic Values

A slight modification of the existing aesthetic properties of the outfall waterfall would occur as a result of the implementation of USACE's project, as proposed.

No effects to recreational or economic values would be expected as a result of project implementation.

3.8 Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem

In-stream construction activities would be conducted during the lowest flow period of Lowell Creek's hydrograph.

Similarly, best management practices and a spill response plan would be developed for in-stream construction activities

3.9 Public Interest Determination

On the basis of the guidelines, the proposed site of the discharge of fill material is specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem.

4.0 FINDING OF COMPLIANCE FOR LOWELL CREEK FLOOD DIVERSION FEASIBILITY ASSESSMENT

1. No significant adaptations of the guidelines were made relative to this evaluation.

2. Seven practical alternatives evaluated the feasibility of reducing flood risk to the community of Seward from Lowell Creek.

3. The planned emplacement of fill material in the Lowell Creek channel would not violate any applicable state water quality standards. Implementation of USACE's project, as proposed, would not violate the Toxic Effluent Standards of Section

307 of the Clean Water Act.

4. Implementation of the proposed project will not affect any endangered species or their critical habitat.

5. The proposed implementation of fill material will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic life and other wildlife will not be adversely affected.

6. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values will not occur.

7. Appropriate steps to minimize potential adverse impacts of the project on aquatic systems include seasonal construction and the development of best management practices.

8. On the basis of the guidelines, the proposed project is specified as complying with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects to the aquatic ecosystem.

5.0 REFERENCES

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