Fremont Cut Vegetation Rehabilitation Plan
Environmental Assessment
Biological Evaluation
Lake Washington Ship Canal, Seattle Washington

U.S Army Corps of Engineers, Seattle District

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1.0 INTRODUCTION

1.1 Authority

The Rivers and Harbors Act of June 25, 1910 granted the original authorities for the double-lock dam and accessory works including the Fremont Cut. The Seattle District, U.S. Army Corps of Engineers (Corps), administers the on-going operations and maintenance (including repair) authorities of the Fremont Cut.

1.2 Background

The Fremont Cut consists of 38.5 acres of Corps, fee-owned holding. The Fremont Cut, like the Salmon Bay Waterway which connects to Lake Union, is oriented on a northwest to southeast alignment. The Fremont Cut is a straight, incised and highly urbanized watercourse created and maintained by Seattle District, U.S. Army Corps of Engineers as a transportation corridor for boats. It is bordered by the Fremont District on the north and the base of Queen Anne Hill to the south. The channel is 5,800 feet in length and 270 feet wide with a 100-foot center channel. The bottom contour slopes steeply from each side until reaching the authorized depth of 30 feet. Concrete sills bolstered by rip-rap line both sides of the channel. The Burke-Gilman bicycle trail cuts through part of the project area. The Fremont Cut is located in NW1/4, NE1/4 and SE1/4 Sec. 13, T.25N, R.3E and in SW 1/4, Sec. 18, T.25N, R.4E., of the Willamette Meridian.

The Lake Washington Ship Canal was listed on the National Register of Historic Places on December 14, 1978. Several landscape features in the Fremont Cut are on the nomination form including the single row of Lombardy poplars lining each side of the Fremont Cut; the concrete revetment and rip-rap lining the canal, and informal subsidiary landscaping, which was part of the beautification projects by the Seattle Garden Club in the late 1950's and 1960's.

Maintenance of the Fremont Cut is divided among three groups. The U.S. Army Corps of Engineers maintains the full length of the southern bank from the Fremont Bridge to the King County Environmental Lab. The Seattle Parks Department under a lease from the Corps maintains the northern bank from its western end to the middle of the block between Phinney and Evanston Street to the east. The Quadrant Corporation, a real estate development company, maintains the remainder of the north bank from the middle of the block between Phinney and Evanston Street to the eastern edge of the Fremont Cut located at the Fremont Bridge. A small portion of the Fremont Cut has been deepened to allow for boat moorage.

This environmental assessment and biological evaluation is the latest coordination effort for a project that started in 1997, when the Seattle District's horticulturist determined that 21 Lombardy poplar trees were hazardous. With the discovery of the condition of the trees along Fremont Cut, the Corps of Engineers prepared a plan titled “Renewing the Historic Colonnade: Fremont Cut”. This plan was designed to address the condition of all the trees along Fremont Cut and provide a plan for the removal and restoration of the poplar trees. Under requirements of the National Historic Preservation Act of 1966, as amended, the proposed plan was reviewed by the Washington State Historic Preservation

Office (SHPO). The SHPO requested that additional historical research and documentation be conducted to establish the historical context of the site and appropriate management recommendations. Subsequently, the Corps prepared the Fremont Cut Cultural Landscape Inventory (see Appendix E).

In addition, the listing of Puget Sound Chinook and Bull Trout under the Endangered Species Act, led to coordination with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service. The Corps of Engineers has produced the Fremont Cut Vegetation Rehabilitation Plan to satisfy requirements of the National Historic Preservation Act and the Endangered Species Act along with addressing public concerns under the National Environmental Policy Act. The Corps has prepared this Environmental Assessment and Biological Assessment pursuant to the National Environmental Policy Act of 1969 and the Endangered Species Act of 1973.

1.3 Project Need

The Corps owns an approximately 15-foot strip of property along both sides of Fremont Cut and has the responsibility for maintaining and removing any trees that pose a risk to persons who recreate at the project area. Lombardy poplars (Populus nigra 'Italica') typically have a 60-75 year lifespan. Approximately 2/3 of the 134 poplars that existed on Corps-owned property before the start of the plan were about 60-70 years old and approximately 1/3 were about 30-40 years old. Due to the age and poor health of the 60-70 year old trees, an arborist was hired to conduct a hazardous tree survey for all poplar trees. Based on the results of the survey, 29 highly hazardous trees were recommended for removal. After coordination with SHPO and the public, these trees were removed in May 1999 (see Appendix A). When cut, some of the trees exhibited advanced decay prompting the Corps to hire the services of Jon D. Johnson, Ph.D., a consulting arborist to conduct core sampling on the remaining trees. Dr. Johnson's report recommended removal of five (5) additional trees. The U.S. Army Corps of Engineers has determined that a comprehensive plan to rehabilitate the remaining stand of poplar trees is needed. As a result, the Fremont Cut Vegetation Rehabilitation Plan was developed and is included in this EA by reference.

1.4 Project Purpose

The purpose of the poplar tree rehabilitation is to safely replace poplar trees and restore understory vegetation along the Fremont Cut.

2.0 DESCRIPTION OF THE PROPOSED PROJECT

The poplar trees were planted in three phases (ca. 1931, the early 1930s, and ca. 1958-68). Understanding that the poplar trees will continue to age and become hazardous, the rehabilitation plan calls for the phased removal and replacement of the remaining 95 trees over an approximately 30 year period between 2001 and about 2030. In addition to rehabilitating the poplar trees, understory shrubs and ground covers will be planted and eroded areas restored.

The removal and planting of the poplars has been broken into four phases, based on a hazard rating and the need to remove hazardous trees first. The first phase to be finished in 2001 will result in the removal of 22 poplars (34 were removed in 1999) and the planting of 55 new trees. Phase II will be conducted in 2010 resulting in the removal of 32 poplars and the planting of 48. Phase III will be conducted in the year 2018 and will result in the removal of 19 poplars and the planting of 23 poplars. Implementation of Phase IV is scheduled for the year 2030. However, before this phase is implemented, poplars in these areas will be reevaluated to determine their health and safety at that time and whether the phase should be implemented in 2030 or delayed for additional years. Phase IV consists of the removal of 21 poplars and planting of 26. The existing non poplar trees will be maintained and, if necessary, be replaced with the same species as required for compliance with the National Historic Preservation Act of 1966.

Beneath and around the trees, various shrubs and ground covers will be planted. The proposed plant species are grouped into three categories: 1) historic planting using the same genus and species as the Seattle Garden Club period; 2) plants of the same genus as existing historic species; or 3) planting native plants. The species composition will be approximately 60% native and 40% non-native. The complete shrubs and ground covers planting list can be found on Page 11 of the Fremont Cut Vegetation Rehabilitation Plan.

All work will be conducted from the landward side. Stumps will be ground to approximately 12 inches below the surface and filled to grade. Most tree debris will be removed from the project site although broken limbs of significant size will be left as cover for juvenile salmonids. The removed trees will be replanted within the same growing season with (*Populus nigra 'Afghanica'*) a bacterial blight resistant variety of Lombardy poplar with similar growth and form characteristics. In addition, noxious and invasive non-native weeds like Scot's Broom (*Cytisus scoparius*), Himalayan blackberry (*Rubus discolor*) and thistles will be removed, where appropriate, to prepare the soils for replanting native and non-native understory.

2.1 Action Area

The action area is confined to the 5,800 feet long and 270 feet wide ship canal extending from the Fremont Bridge to the East and the King County Environmental Lab to the West. The action area includes the 12-15 feet wide strip of trees and other vegetation along both banks of the Fremont Cut, and the 100 feet wide and 30 feet deep body of water in the canal.

3.0 AFFECTED ENVIRONMENT

3.1 Geology and Soils

The soils and land types of the King County Area were formed largely in deposits of glacial drift laid down during the Vashon period of the Fraser glaciation late in the Pleistocene. The major kinds of material left by the glacier are till, recessional outwash, and pro-glacial lacustrine and outwash sediments (Washington Agricultural Experiment Station 1973).

The action area and project are founded upon the landtype known as "Vashon till" commonly found throughout King County. Vashon till consists of very dense, consolidated lodgement till that ranges in thickness from about 5 feet to nearly 100 feet and has a mantle of ablation till about 3 feet thick. The ablation till is loose, and it is in this material that soils of the Alderwood series formed (Washington Agricultural Experiment Station 1973). The till plain is undulating and slopes are mostly between 6 and 15 percent.

3.2 Water Quality

Water flows westward through Fremont Cut from Lake Union to Salmon Bay. Although Salmon Bay was historically a marine environment, it was converted to freshwater by the addition of water from Lake Union which enters Salmon Bay through the Fremont Cut. Lake Union serves as the control of water quality in the Fremont Cut. Lake Union is shallow (15 m deep) and contains a seasonally fluctuating saltwater layer at the bottom. This saltwater layer intrudes into Lake Union from operation of the Chittenden Locks several miles downstream. The saltwater layer becomes larger, and intrudes further into the system during summer when inflow decreases and boat use through the Locks increases. According to the Washington state surface water quality standards (173-210A-130(58)WAC), salinity in the Ship Canal shall not exceed one part per thousand at any point or depth along a line that transects the Ship Canal at the University Bridge which is always adhered to except during the driest of years.

During high flow periods, Lake Union completely flushes once per week causing the saltwater layer to disappear from the lake from November through April (Hansen et al.,1994). During low flow periods, flushing can be incomplete when flows are short-circuited directly from the north part of the Montlake Cut to the Ship Canal. This short-circuiting of flows, along with the saltwater layer in the lake, seems to have caused stratification in Lake Union to be stronger and longer in duration than a thermally-stratified lake.

The overall effect of the strong stratification is that available salmonid habitat is greatly reduced by high temperatures and low dissolved oxygen. During summer, the dense saltwater layer and bacterial decomposition of highly organic sediments causes the bottom of Lake Union to become anoxic. In addition, the stratefied epilimnion of the lake becomes very warm. It has been suggested that warm surface water temperatures in Lake Union are increasing in duration over time; over 25 years, the number of days when surface water temperatures have exceeded 20 degrees Celsius has increased from 40 days to over 80 days (Doug Houck, King County, pers. comm.). The stratified waters of Lake Union serve as a large reservoir of warm water which feeds directly into the Fremont Cut and drives the water quality of the Fremont Cut.

3.3 Air Quality

Air quality in the Puget Sound Basin is generally good. However, urban areas experience moderately degraded air quality during certain times of the year. Motor vehicles are the largest source of air pollutants in King County, although wood-burning stoves also

contribute. Particulates, sulfur dioxide, ozone, and carbon monoxide are the pollutants of concern. High concentrations of these pollutants generally occur during the dry, late summer months when minimal wind conditions persist for long periods of time or during mid-winter thermal inversions.

Carbon monoxide, a product of incomplete combustion, is generated by automobiles and other fuel burning activities (e.g. residential heating with wood). The highest ambient concentrations of carbon monoxide tend to occur in localized areas such as major roadways and intersections during periods of low temperatures, light winds, and stable atmospheric conditions. Ozone is a highly reactive form of oxygen created by sunlight-activated chemical reactions of nitrogen oxides and volatile organic compounds. Unlike high carbon monoxide concentrations which tend to occur close to emission sources, ozone problems tend to be regional since ozone precursors can be transported far from their sources. Ozone precursors are primarily generated by motor vehicle engines.

3.4 Vegetation

Vegetation at Fremont Cut consists of Lombardy poplars, other trees species, shrubs and ground covers. The Lombardy poplars are planted primarily in singles rows located on the banks of each side of Fremont Cut The ground cover along the Fremont Cut consists primarily of cultivated grass, the understory vegetation consists of woody ornamental and native shrubs, some of which overhang the bank. Interspersed within and beyond the ends of the colonnade are a variety of native and non-native species including tree species such as European birch, big leaf maple, flowering cherry, blieriana plum, and European mountain ash. The project area also has many locations which lack significant vegetation and are used for human access.

The Seattle Garden Club undertook subsidiary landscaping of an informal nature along the banks as a beautification project in the 1950's. The results of this planting still remain today. More recently, the City of Seattle planted shrubs and trees while the property was under lease agreement to the City's Department of Parks and Recreation (USCOE, 1998).

3.5 Aesthetics

The rows of trees along both sides of Fremont Cut are visually the most significant vegetation in the area. Since the 1950's, the Fremont Cut has provided a park like atmosphere in an otherwise industrial area. The area is now dominated by business offices and the service industry. The poplars and other trees of the Fremont Cut provide a geographical reference for travelers and residents.

3.6 Cultural Resources

The project area lies within a historic district nominated by the U.S. Corps of Engineers to satisfy National Historical Preservation Act requirements. The district was listed on the National Register of Historic Places in 1978.

The Muckleshoot Indian Tribe has historically subsisted in the Seattle area and currently claims the Fremont Cut as part of their "usual and accustomed" fishing grounds. Prior to the construction of the Fremont Cut, the local tribes would have used the site for hunting,

fishing and gathering local food items. Temporary harvest camps may have been established in the project area but none have yet been found along the Fremont Cut.

Fishing within the project area is restricted to sport and tribal harvest. The Fremont Cut is not conducive to commercial harvest due to its narrow width and high boat traffic. Tribal net fisheries historically took advantage of the areas surrounding the project site. However, the site as it is today does not encourage the fishing of tribal nets due to heavy boat traffic, high landward recreational use, and lack of anchoring locations.

3.7 Aquatic Resources

The Fremont Cut serves as the only migration route for anadromous fish species that inhabit Lake Washington, Lake Sammamish, Cedar River, and their associated tributaries. Fish may be found passing through the project area almost year-round and include the pacific salmon species of chinook, coho, and sockeye. The sockeye salmon of Lake Washington make up the largest sockeye run in western Washington exceeding 650,000 in 1988, 1996 and 2000 but more commonly exceeding around 150,000 fish. The coho of Lake Washington and its adjacent systems have been the focus of severe fishing restrictions within Puget Sound and the Pacific Ocean. Steelhead trout of the Lake Washington system also travel through the project are during their annual outmigration and upward spawning runs. The Lake Washington steelhead is of special concern and is being considered as a candidate for the Endangered Species Act. Habitat destruction and alterations have impacted this species severely. Other species expected to travel through the project area include longfin smelt, northern pikeminnow, and peamouth chub. The salmon and trout species use the project area only for feeding or as a migratory corridor.

Resident fish include cutthroat trout, rainbow trout, freshwater sculpin, three-spine stickleback, peamouth chub, longnose dace, and several species of exotic warm water species such as largemouth bass, bluegill, catfish, yellow perch and carp. Despite the intrusion of saltwater into Salmon Bay and Lake Union, marine species of fish and invertebrates are not expected to occur within the project area.

3.8 Terrestrial Resources

A variety of birds may be found along the Fremont Cut including Bald Eagles, Double-Crested Cormorants, Canadian Geese, Mallard ducks, Gulls, and song birds. Of these, only the double-breasted cormorants appear to use the Fremont Cut for a specific purpose. The Fremont Cut is home to a seasonal presence of 200-300 cormorants that perch in the poplar trees of the Fremont Cut. According to several sources, the cormorants primarily use the poplars as night roosts and disperse to their feeding sites daily. The cormorants apparently feed in Lake Washington, Lake Union and the Puget Sound. Other sources state that the cormorants usually start to arrive when the leaves start dropping from the trees, and depart once the trees are in leaf again. According to Herb Kurl and the Seattle Audubon Society, the cormorants are mostly gone from the area from the middle of May through the middle of September(Kurl, 2000). This absence of the cormorants from mid-May to mid-September along the Fremont Cut is also stated in the book Birding in Seattle and King County by Eugene S. Hunn 1982. The cormorants prefer the poplar trees located on the southwest quadrant of the Fremont Cut.

Mammals and furbearers found in the area are limited to the common opossum, raccoons, feral cats, domestic dogs, rabbits, eastern gray squirrels, rats, mice and moles.

3.9 Threatened and Endangered Species

The Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*), Puget Sound Bull Trout (*Salvelinus confluentus*) and the Bald Eagle (*Haliaeetus leucocephalus*) are the only federally listed species likely to be present in the project area. The bald eagle and bull trout are administered by the U.S. Fish and Wildlife Service. The chinook salmon is administered by the National Marine Fisheries Service. These three species are the focus of this Biological Evaluation.

3.9.1 Puget Sound Chinook Salmon

Chinook are anadromous and semelparous. Within this general life history strategy, however, chinook display a broad array of tactics that includes variation in age at seaward migration, variation in length of freshwater, estuarine, and oceanic residence, variation in ocean distribution and ocean migratory patterns, and variation in age and season of spawning migration. In an extensive review of the literature, Healey (1991) used differences in life history patterns to divide eastern Pacific Chinook salmon into two broad races: stream-type populations and ocean-type populations. Lake Washington Basin chinook appear to be relatively well-matched with the description for ocean-type chinook. Ocean-type chinook migrate to sea during the first year of life, generally within the first 3 months after emergence.

Chinook spawning behavior is similar to that of other salmonids. The female selects an appropriate location over gravel and small cobble substrate where she excavates the redd. After spawning, females have been reported to remain on the redd from 4 to 26 days until they die or become too weak to hold in the current (Neilson and Green 1981, Neilson and Banford 1983). During the period, females will vigorously defend their redd against the spawning activity of newly arriving fish.

There are a number of factors that have affected the survival of Lake Washington Basin Chinook salmon, including loss and degradation of stream habitat resulting from a variety of land and water management practices. Predation by native and introduced species in the river and lake, injury to juvenile fish exiting the lake via the Hiram M. Chittenden Locks, droughts, floods, over-harvest and unfavorable ocean conditions have also been implicated in the Chinooks decline.

Three stocks of chinook are present in Lake Washington Basin: (1) the Issaquah Creek stock, a composite population that is at least partially sustained by production from the Issaquah hatchery; (2) the Cedar River stock, classified as native/wild; and (3) the north Lake Washington tributary stock also classified as native/wild. Annual counts of spawners for the period from 1989 to 1996 averaged approximately 1,600 fish in Issaquah Creek, 420 fish in the Cedar River, and 285 fish in the north Lake Washington tributaries. Of the three species of salmon returning to Lake Washington, Chinook salmon are the least numerous. Adult chinook enter Lake Washington through the

Chittenden Locks from late June through September with a peak in late August. Juvenile chinook migrate out through the Chittenden Locks and into Puget Sound between May and July (Woodey, 1967,1969,1970)(Traynor, 1971).

3.9.2 Bull Trout

Bull trout are known to exhibit four types of life history strategies. The three freshwater forms include adfluvial forms, which migrate between lakes and streams; fluvial forms, which migrate within river systems; and resident forms, which are non-migratory. The fourth strategy, anadromy, occurs when the fish spawn in fresh water after rearing for some portion of their life in the ocean.

In fluvial and adfluvial bull trout populations, adults undergo spawning migrations of up to 140 miles (Shepard et al 1984). Adults from fluvial populations are found in rivers and larger streams. Smaller tributaries act as breeding grounds and rearing areas for juveniles. Adfluvial populations are found in regions with lakes or reservoirs. Juveniles may remain from one to six years in nursery streams before migrating to rivers (fluvial) or lakes (adfluvial). As adults, they usually live in rivers or lakes for two to three years before spawning (Allan 1980; Fraley and Shepard 1989). The anadromous form of bull trout has been little studied, however, larger juvenile and adult bull trout are known to migrate through the marine waters of Puget Sound (Goetz 1989).

The largest single population of bull trout, adfluvial form, in western Washington is found above Cedar Falls in the upper Cedar River watershed. It is believed a small number of bull trout pass through the reservoir and downstream hydroelectric facilities to river reaches below Cedar Falls. However, it is apparently not sufficient to support the establishment of bull trout populations under the current ecological conditions (City of Seattle 1999). Anecdotal reports point to a historic population at the headwaters of Issaquah Creek in the Sammamish Lake Basin. Recent surveys have not confirmed these reports (B. Fuerstenberg, King County, pers. comm.).

Native char, presumably bull trout, have been observed in the fish ladder viewing pool at the Locks as recently as 1997 (E. Warner, pers. comm.) while isolated reports of native char being caught in or around Lake Washington occur every few years. A larger juvenile char, again presumably a bull trout (~250 mm, 3 year old) was caught in the lower Cedar River in July of 1998 (M. Martz, Corps, pers. comm.). An adult char was also caught in the lower Cedar River in April of 1993 (E. Warner, MIT, pers. comm).

The factors affecting Puget Sound bull trout decline include; habitat degradation, with a variety of causes, including reservoir operations, dams, agricultural practices, urbanization, forest management, and human constructed barriers in streams; over-fishing and poaching; inadequacy of existing regulatory mechanisms; and impacts from introductions of nonnative species.

3.9.3 Bald Eagle

The bald eagle is a federally listed threatened species and a threatened species at the state level in Washington. The bald eagle was listed as endangered throughout the lower 48 states in 1978, except for Michigan, Minnesota, Wisconsin, Washington, and Oregon, where it was listed as threatened. In 1995, bald eagle populations in other states were downlisted from endangered to threatened by the U.S. Fish and Wildlife Service. In Washington State, the number of active bald eagle nests has increased steadily since 1980, and now numbers over 550 (WDFW 1997c). However, for unknown reasons, reproductive rates in the Hood Canal and Lower Columbia River areas remain below the target level of one young per nest per year.

Destruction or degradation of habitat and human disturbance are the main threats to bald eagle populations. Habitat alteration can limit suitable nesting and roosting habitat, and human disturbance can cause birds to leave their nests and can affect prey availability (WDW 1991). Bald eagles are particularly intolerant of human disturbance during the breeding season (USFWS 1986). Human activity has been documented to cause nest abandonment and reproductive failure (Bogener 1980; Lehman 1983).

Bald eagles are observed within the Seattle metropolitan area throughout the year. Bald eagles have been sighted every month of the year near the Ship Canal and Locks, however, no nests have been confirmed in the project area. The closest nest site is at Discovery Park, approximately one mile from the locks. There is also a nest at Woodland Park, approximately 3 miles from the locks. Salmon carcasses are assumed to be an important food source for bald eagles throughout the Lake Washington watershed.

4.0 ALTERNATIVES

Several alternatives were considered during the planning of this project. The alternatives centered on removal of the hazardous poplar trees on varying time schedules. Several phasing approaches were considered before the existing plan was selected. The no action alternative was also considered.

4.1 No Federal Action

The 95 Lombardy poplars that remain on Corps managed property have a 60-80 year life span. Many of the poplar trees in the project area are approximately 60-70 years old and are nearing the end of their life expectancy. If the removal of the Lombardy poplars is not pursued, they will continue to age and pose a serious hazard for boats and people that recreate along the Fremont Cut. Damage to human life, power lines, boats, cars, roads, and buildings are all possible by falling trees or tree limbs in the project area. The No-Action alternative does not address existing safety issues or eliminate the Government's current liability.

4.2 Summary of Alternatives

Poplar removal and rehabilitation options range from immediate removal of all trees (including non-poplars) and replanting with poplars, to the block removal of trees (all

types) and replanting with poplars between an 11-year and 30-year time period (see Renewing the Historic Colonnade, draft). All options proposed an even 25-foot spacing for replacement poplars and recommended the use of *Populus nigra 'Afghanica'* for the existing Lombardy poplars (*Populus nigra 'Italica'*). The options focused only on poplar trees and did not address the rehabilitation of other trees, shrubs, and ground covers.

4.3 Preferred Alternative

The Fremont Cut Vegetation Rehabilitation Plan currently describes the preferred alternative. The removal is phased over 30-years with cutting scheduled every 4-10 years (Table 1). Selection of this plan was based on several factors. First, the gradual removal based on tree health best minimizes the potential impacts to the fish and wildlife thus meeting the requirements of the Endangered Species Act. Secondly, it provides a safe environment for the public. Lastly, replanting historic vegetation with the same species that exists now meets the rehabilitation guidelines for historic vegetation. The planting of shrubs and groundcover consists primarily of native shrubs and other understory plants to help meet requirements under the Endangered Species Act along with providing erosion protection. In addition, public input was considered and, finally, the gradual removal and replacement of vegetation is the most aesthetically acceptable.

	Year 2001	Year 2010	Year 2018	Year 2030
PHASE I (2001) Remove 22 (34 removed 1999) Plant 53 new +2 ext. saplings	12 ft. tall	39 ft. tall	63 ft. tall	99 ft. tall
PHASE II (2010) Remove 32 Plant 40 new + 8 ext. saplings	50-120 ft.	12 ft.	36 ft.	72 ft.
PHASE III (2018) Remove 19 Plant 23 new + 1 ext. sapling	50-110 ft.	77-110+ ft.	12 ft.	48 ft.
PHASE IV(2030) Remove 26 Plant 21 new + 5 ext. saplings	20-100 ft.	47-110+ ft.	69-110+ ft.	12 ft.
# of poplars approx. 50 feet high or taller	73 poplars	43 poplars	81 poplars	104 poplars

Table 1: Poplar Removal and Replanting by Year/Phase with Projected Poplar Heights.
*Poplars can grow 3-5 ft. per year, projected growth is based on 3 ft. per year.

5.0 ENVIRONMENTAL CONSEQUENCES OF THE PREFERRED ALTERNATIVE

5.1 Geology and Soils

The proposed project will not disrupt the geology or soils of the area. No impacts anticipated.

5.2 Water Quality

The proposed project will not significantly impact water quality. All work will be conducted from the landward sides of the Fremont Cut to eliminate the need for a barge. Water quality of the Fremont Cut appears to be controlled by the larger surrounding water bodies particularly Lake Union. The trees along Fremont Cut do provide partial filtered shade to the water in the morning and evening hours but do not have a noticeable effect on water temperature. The phased removal and replacement of the trees along with the addition of understory vegetation will spread the loss of available shading and result in additional shading in the long term.

5.3 Air Quality

During construction, there will be a temporary and localized reduction in air quality due to emissions from chainsaws and trucks operating during tree removal. These emissions will not exceed EPA's de minimis threshold levels (100 tons/year for carbon monoxide and 50 tons/year for ozone) or affect the implementation of Washington's Clean Air Act implementation plan. Significant impacts are not anticipated.

Ambient noise levels will increase slightly during tree removal. However, these effects will be temporary and localized, and occur only during daylight working hours. Given the industrial nature of the project area, the temporary elevations in noise level will not be significant.

5.4 Vegetation

Since 1997, the purpose of this project is to remove hazardous Lombardy poplars and replace them with similar poplars. In addition, the plan calls for the increase of shrubs and ground cover over the project area. The gradual removal and replacement of the existing vegetation over a gradual 30-year period with like species does not constitute a significant impact. For more detail see the attached Fremont Cut Vegetation Rehabilitation Plan.

5.5 Aesthetics

The proposed project has minimized any degradation to the aesthetic values by selecting the 30-year phased removal and replacement of the vegetation as the preferred plan. This should reduce visible reduction in the appearance of the "colonnade" as much as practicable. In the long term, the additional poplar, shrub and ground cover should enhance the aesthetic value at the site.

5.6 Cultural Resources

The Fremont Cut is a highly modified boat transportation canal which did not exist prior to European settlement. The land surrounding the project was highly modified by extensive excavation and fill activities commensurate with construction of the Chittenden Locks early in the 20th Century. It is unlikely that archaeological sites or artifacts would have survived this period of alteration and be subject to discovery by activities associated with this plan. This plan is restricted to removing trees and planting of understory, both of which require no significant excavation.

5.7 Aquatic Resources

Poplar tree removal and replanting will be conducted between October 15 and March 15 to avoid the migration of anadromous fish species that inhabit Lake Washington. During these months, it is not anticipated that adult or juvenile salmon will be present in the project area. Resident fish inhabiting Lake Union and the Fremont Cut may be present during the work months. Work will be conducted from land in order to avoid the use of barges and the potential for petroleum spills or excess turbidity entering the water and affecting resident fish. Warmwater fish inhabiting the Fremont Cut are generally deeper in the water column during the winter months and are unlikely to be affected by tree removal or replanting activities.

Food production for resident fish as a result of the Fremont Cut vegetation may be reduced to the extent that they were produced by the removed poplars and disturbed understory. Cutthroat, resident rainbow trout and northern pikeminnow of Lake Washington are not generally considered to rely heavily on terrestrial prey items. Chironomide and other aquatic benthos as well as other fishes are most often found in the stomachs of Lake Washington resident salmonids. Small resident fish are not abundant in the Fremont Cut but may be most impacted by reduced terrestrial food items. For both resident salmonids and small resident fishes, it is not likely that the proposed project will result in a measurable reduction in available food items, particularly in spring and summer when feeding activity is highest. Warm water species will not be affected by a small reduction in terrestrial food items as they are generally piscivorous and feed mostly during the spring and summer months when food supplies are abundant.

5.8 Terrestrial Resources

The phased removal of the hazardous poplars along the Fremont Cut will have a minimal affect on the birds in the area. At present, there are 107 large poplars and approximately 60 large native trees along Fremont Cut. After Phase I of the proposed rehabilitation plan, approximately 70% of the large trees along Fremont Cut will still be present thus minimizing the impact to birds. Due to the many years between the phases of the rehabilitation plan that allow for tree growth, the percentage of large trees will only increase as the phases progress, thus further reducing the loss of available perching habitat.

Mammals found in the project area do not require large Lombardy poplars for any of their life stages. The phased removal and replacement of hazardous poplar trees is not expected to have any significant effects to mammals in the area.

5.9 Threatened and Endangered Species

5.9.1 Puget Sound Chinook Salmon

The project site provides very little fishery support function. Based on qualitative surveys, habitat found within the Fremont Cut is generally described as severely degraded. A lack of habitat complexity and existing bank hydromodification greatly limits rearing and feeding opportunities in the project area. The Corps expects no disturbance of the water column or aquatic habitat, as the project will be conducted with land based equipment. The nature of vegetation removal is not considered unusual or extraordinary to the experience of juvenile chinook salmon and would not, therefore, be considered likely to cause migration delay or otherwise significantly alter behavior. Tree removal for all phases will be conducted from October 15 through March 15 to avoid chinook salmon presence and, therefore, minimize effects to that species.

The loss of insect production is not an affect as the Fremont Cut is not utilized as rearing habitat by Chinook salmon. Juvenile chinook salmon pass through the project area only to make their way to the marine waters west of the Chittenden Locks. Although juvenile salmon are thought to feed while in transit to the marine environment, stomach analysis of juvenile chinook of Lake Washington shows that, aquatic zooplankton and macrobenthos make up the majority of the Lake Washington chinook diet. Since the characteristics of the Fremont Cut closely model that of Lake Washington, it is believed that chinook that may feed in the project area would prefer a similar diet and be unaffected by small scale changes to terrestrial vegetative composition. Likewise, the construction of this project and final project results will likely enhance, not reduce, the current level of allochonous prey production.

The poplar trees are not a potential source of woody debris as the Fremont Cut is a navigation channel kept clear of all significant woody debris. Existing levels of woody debris and overhanging vegetation will be enhanced, not reduced by this project. In addition, all future introductions of small woody debris into the navigation canal because of windfall or tree removal will remain providing it does not become a navigational hazard. This will increase the level of small woody debris into the Fremont Cut.

Corps measurements repeatedly record summer surface temperatures at the Fremont Bridge up to 70^{o}F and bottom water temperatures as high as 68^{o}F. These high summer water temperatures can be detrimental to adult chinook and are a function of Lake Union stratification expected to appear with or without the poplar trees and associated vegetation. The loss of filtered shade from the removed poplar trees and subsequent increase in direct sunlight upon the Fremont Cut represents the only possible affect to Chinook salmon from this project. Furthermore, this effect is limited to juvenile salmon that do transit the project area in their directed migration toward the Chittenden Locks. Adult chinook transiting the area prefer the deeper relatively cooler waters found deep in the navigation channel and will be, therefore, unaffected by the sporadic upland removal of shade trees. The rehabilitation of Fremont Cut vegetation will cause no perceptible decrease in water quality or alter the energy expenditure of chinook found transiting the Fremont Cut.

Due to the gradual removal of the trees over a 30-year time period, the loss of shading to the canal will be minimized as much as practicable while maintaining a safe environment for the public.

5.9.2 Bull Trout

The impacts to bull trout as a result of this proposed project follow the same general trend as discussion in 8.41. above. Bull trout would only be in Fremont Cut if they were migrating to the Puget Sound. Bull trout are the most temperature-sensitive fish found in the state of Washington. It would be highly unlikely to find bull trout residing in the warm waters of the Fremont Cut.

5.9.3 Bald Eagle

Due to the low numbers of Bald Eagles utilizing the habitat at the Fremont Cut, and the gradual removal and replacement of the trees along Fremont Cut will have no impact to Bald Eagles. The biggest reduction in large trees (40feet or taller) will occur in Phase I of the proposed rehabilitation plan where about 30% of the trees 40 feet tall or taller will be removed. With a maximum of three eagles spotted in the area at one time, there will be plenty of trees available for perching, roosting, feeding, and preening.

6.0 INTERDEPENDENT AND INTERRELATED EFFECTS

None anticipated.

7.0 MANAGEMENT ACTIONS RELATED TO THE SPECIES

To ensure minimal potential for affect to Chinook salmon due to this project, the hazardous tree removal will be conducted from the landward side to eliminate any barging or temporary impact to the aquatic environment.

The removal of poplar trees will be phased over a 30-year period to minimize disturbances related to unshaded waters. The vegetated understory will be rehabilitated and enhanced to provide additional levels of overwater cover and near shore shading.

Poplar removal will occur in the fall or early spring periods outside that of juvenile and adult chinook migration.

The Corps proposes the scheduled removal of the remaining poplar trees and rehabilitate eroded and denuded areas.

Broken limbs and tree debris of an appropriate size will be left as cover for juvenile salmonids.

The removed trees will be replanted within the same growing season with ghost poplar (*Populus nigra 'Afghanica'*). The ghost poplar has similar characteristics to the

Lombardy poplar but is resistant to a bacterial blight that attacks Lombardy poplar trees. New trees will be 10-12 feet in height at the time of planting.

7.1 Habitat Restoration Potential

The high degree of urbanization and vegetation management in the uplands of the project area inhibits large scale restoration opportunities. The full-length of the project area on both banks is heavily managed for the colonnade of poplars and various understory plants. The poplars are currently listed as contributing features on the National Register of Historic Places as described by the NHPA and are required to remain in a similar condition into the future (USCOE, 1998). This precludes any significant re-vegetation efforts within the project area under this revetment rehabilitation effort. The poplars removed under the hazardous tree removal plan must be replanted with the same species of poplar. The height of the replacement trees will be 12 feet and they are projected to grow 3 ft. per year although they can grow from 3-5 feet per year. During all phases of this project, the majority of the poplars will be taller than 40 feet. The U.S. Army Corps of Engineers will also be planting shrubs and ground cover to increase the amount of vegetation overhanging the channel. These plants will increase the amount of insects and leaves entering the water resulting in an increase in productivity. It is also thought that the proposed species will provide better habitat and food sources for native songbirds. No other restoration activities are included in this plan.

8.0 DETERMINATIONS

The U.S. Army Corps of Engineers concludes, based on the above analysis and supporting documentation, that the Fremont Cut Tree Renewal Plan will have insignificant effects on Chinook salmon transiting the Fremont Cut if carried out as described. The U.S. Army Corps of Engineers also concludes that this project will not inhibit the recovery of Chinook salmon within its Evolutionary Significant Unit. As such, the U.S. Army Corps of Engineers determines this project will **not likely adversely affect** Puget Sound Chinook salmon. In addition, the U.S. Army Corps of Engineers determines this project will **not likely adversely affect** bull trout or the Bald Eagle.

9.0 UNAVOIDABLE ADVERSE EFFECTS

Unavoidable adverse effects associated with this project include: (1) a temporary reduction in large trees which may disrupt wildlife in the area, and (2) a temporary and localized increase in noise which may disrupt wildlife in the area.

10.0 COORDINATION

Coordination was conducted throughout the 4 years that the rehabilitation plan has been evolving. Federal, state, city, and local agencies along with the general public have been involved in the formulation of the vegetation rehabilitation plan.

11.0 CUMULATIVE EFFECTS

None anticipated.

12.0 IRREVERSABLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The irreversible and irretrievable commitment of resources is described as the use of materials, resources, or land during implementation of an alternative that makes these resources unavailable for other uses, given known technology and reasonable economics.

Industrial resources that will be required during implementation of the selected alternative include fossil fuels, as well as labor and capital.

13.0 ENVIRONMENTAL COMPLIANCE

13.1 National Environmental Policy Act

In accordance with the National Environmental Policy Act, federal projects are required to declare potential environmental impacts and solicit public comment. The purpose of this document is to solicit public comment and fulfill the Corps of Engineers documentation requirements under the National Environmental Policy Act.

13.2 Endangered Species Act Section 7

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973, as amended, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed or proposed threatened or endangered species. This document provides the resource agencies with the wildlife impact analysis of the proposed vegetation restoration project.

13.3 National Historic Preservation Act

The National Historic Preservation Act of 1966, as amended requires that the effects of proposed actions on sites, buildings, structures, or objects included or eligible for the National Register of Historic Places must be identified and evaluated. The primary reason for the development of a new vegetation rehabilitation plan was due to requirement under this act. For a complete and detailed history of National Historic Preservation Act involvement, see Appendix E of the Fremont Cut Vegetation Rehabilitation Plan.

13.4 Clean Air Act

The Clean Air Act requires states to develop plans, called State Implementation Plans (SIP), for eliminating or reducing the severity and number of violations of National Ambient Air Quality Standards (NAAQS) while achieving expeditious attainment of the NAAQS. The act also required Federal actions to conform to the appropriate SIP. An action that conforms with a SIP is defined as an action that will not: (1) cause or contribute to any new violation of any standard in any area; (2) increase the frequency or

severity of any existing violation of any standard in any area; or (3) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

The U.S. Army Corps of Engineers has determined that emissions associated with this project will not exceed EPA's *de minimis* threshold levels (100 tons/year for carbon monoxide and 50 tons/year for ozone).

13.5 Coastal Zone Management Act

The Coastal Zone Management Act of 1972, as amended, requires Federal agencies to carry out their activities in a manner which is consistent to the maximum extent practicable with the enforceable policies of the approved Washington Coastal Zone Management Program.

The Corps conducted a review of the Seattle Municipal Code Chapter 23.60-Shoreline District. Based on that review, the Corps has determined that the proposed project is consistent to the maximum extent practicable with enforceable policies of the City of Seattle shoreline management program. The following sections of the code are relevant to our project:

SMC 23.60.152 letter H, All shoreline developments and uses shall be located, designed, constructed and managed to avoid disturbance, minimize adverse impacts and protect fish and wildlife habitat conservation areas including, but not limited to, spawning, nesting, rearing and habitat areas, commercial and recreational shellfish areas, kelp and eel grass beds, and migratory routes. Where avoidance of adverse impacts is not practicable, project mitigation measures relating the type, quantity and extent of mitigation to the protection of species and habitat functions may be approved by the Director in consultation with state resource management agencies and federally recognized tribes. The 30 year gradual removal and replacement of the poplars and the addition of native understory vegetation is designed to avoid or minimize the adverse impacts to the natural areas of biological significance.

SMC 23.60.152 letter I, All shoreline developments and uses shall be located, designed, constructed and managed to minimize interference with or adverse impacts to beneficial natural shoreline processes such as water circulation, littoral drift, sand movement, erosion and accretion. By conducting all work from the land, no impacts to shoreline processes such as water circulation will occur. The revegetation of the understory area will also reduce erosion, which is consistent with the code.

SMC 23.60.152 letter O, Navigation channels shall be kept free of hazardous or obstructing development or uses. By removing the hazardous trees, the project is consistent with the code.

SMC 23.60.152 letter Q6A, An open channel, unobstructed by vessels or structures for access to and from the water for public navigation and for access to adjacent properties

shall be maintained. By removing the hazardous trees and replacing the vegetation, the project is consistent with the code.

SMC 23.60.332 letter A, Development in the CP Environment shall be located and designed to minimize adverse impacts to natural areas of biological or geological significance and to enhance the enjoyment by the public of those natural areas. The 30 year gradual removal and replacement of the poplars and the addition of native understory vegetation is designed to minimize the adverse impacts to the natural areas of biological significance. By removing hazardous trees the U.S. Army Corps of Engineers are enhancing the enjoyment by the public, therefore, the project is consistent with the code. A letter from the Washington Department of Ecology concurring with this determination has been received.

13.6 Clean Water Act.

The Clean Water Act was created to establish and enforce water quality standards as well as regulate the dredging and filling of navigable waters. The proposed project has been informally coordinated with members of the U.S. Army Corps of Engineers Regulatory Section and the members of the Department of Ecology. The proposed project will continue to explore statutory requirements under Section 404 and 401 of the Clean Water Act. The project will not include in-water work, will not discharge material into navigable waters or violate water quality standards.

14.0 CONCLUSION

Based on the above analysis, this project is not a major Federal action significantly affecting the quality of the human or natural environment; and, therefore, does not require preparation of an environmental impact statement.

15.0 REFERENCES

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