FINDING OF NO SIGNIFICANT IMPACT
Kenmore Federal Navigation Channel Maintenance Dredging
Fiscal Year 2020
King County, Washington

1. **Name of Waterway:** Kenmore Federal Navigation Channel

2. **Background.**

The U.S. Army Corps of Engineers (USACE) is undertaking the following project as authorized by Congress in Section 107 of the Rivers and Harbors Act of 1960. The Navigation Project was completed in March 1981. The most recent maintenance dredging of the Kenmore Navigation Channel occurred in January 1998 and removed 49,126 cubic yards (cy) of sediment. The Kenmore Navigation Channel is adjacent to the Sammamish River at the north end of Lake Washington. Authorized features of the Federal navigation project include a channel from deep water to the Kenmore Industrial Park that is 2,900 feet long and 100 to 120 feet wide. The authorized channel depth is 15 feet below low lake level in Lake Washington (equivalent to +20 feet mean lower low water). The authorized navigation channel dimensions allow safe navigation during all lake levels.

Maintenance dredging is necessary for safe navigation conditions to the Kenmore industrial park and surrounding areas. Existing businesses using the channel include CalPortland and Kenmore Air. When the channel becomes too shallow, barges must be loaded to less than capacity in order to use smaller tugboats that will not run aground. This leads to significant inefficiencies for existing users and reduces the potential for new business at the industrial park.

3. **Action.**

USACE proposes to conduct maintenance dredging of accumulated sediment from the Kenmore navigation channel. Maintenance dredging will consist of removing up to 45,000 cy of material within the channel to a depth of 15 feet BLL plus two feet of allowable overdepth dredging. The method will be mechanical dredging with material placed on a barge then transferred for disposal at an upland facility. The details of the dredging, transloading and disposal can be found in sections 2.2 and 2.3 of the Environmental Assessment (EA).

USACE expects the duration of dredging and disposal to take up to 77 days. Dredging may occur up to 24 hours a day, 7 days a week. Dredging and disposal will occur within the approved Washington Department of Fish and Wildlife in-water construction window of 16 November to 1 February to avoid vulnerable life stages of sensitive and Endangered Species Act (ESA)-listed species.

4. Coordination.

The Federal action is described in the EA Kenmore Federal Navigation Channel Maintenance Dredging and Disposal FY 2020, dated September 2020, and is hereby incorporated by reference.

a. Letters of Comment and Response:

A public comment period on the Draft EA occurred 8 June 2020 to 15 July 2020. Comments were received from eight different individuals or organizations, including Kenmore residents, the City of Kenmore, Tribes, and State and Federal agencies. Comments and USACE responses can be found in Appendix G of the EA.

b. Federal Agencies:

The United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), and the Department of the Interior, U.S. Fish and Wildlife Service (USFWS) are responsible for the ESA listed species in and around the Kenmore Navigation Channel. USACE submitted a Biological Assessment (BA) for maintenance dredging to NMFS and USFWS (the Services). USFWS concurred with USACE's determination of "may affect, not likely to adversely affect" for bull trout and their critical habitat on 12 March 2020. NMFS provided a Biological Opinion on 25 June 2020. NMFS required USACE to implement Reasonable and Prudent Measures in the Biological Opinion by following terms and conditions to minimize the level of "take" associated with the proposed action for these species. USACE incorporated the measures into the Mitigation and Monitoring section of the final EA for maintenance dredging and upland disposal. USACE will comply with the reasonable and prudent measures of the Biological Opinion to avoid and minimize adverse impacts to ESA-listed species.

c. State and Local Agencies:

(1) USACE has determined that the proposed project is consistent to the maximum extent practicable with the enforceable policies of the approved Washington State Coastal Zone Management Program, using the City of Kenmore Final Comprehensive Plan and Kenmore Shoreline Master Program. USACE submitted a Coastal Zone Consistency Determination and received conditional concurrence from Washington Department of Ecology (Ecology) 28 August 2020.

(2) No cultural resources have been identified within the Kenmore navigation channel.

d. Treaty Tribes:

Five Native American Tribes may have usual and accustomed fishing rights within the area of the proposed dredging and upland disposal of material. USACE has sent letters

to the tribal chairs and tribal biologists soliciting feedback to avoid impacts to tribal fisheries resources. As of the date of the finalization of the EA and this Finding of No Significant Impact, the Tribes have either not responded with objections or have been provided with information sought without further objection.

5. Environmental Effects and Impacts.

a. Summary of Effects:

The EA for Kenmore Federal Navigation Channel Maintenance Dredging and Disposal, describes the effects of the proposed project. Unavoidable adverse effects include disruption of benthic communities, minor and temporary water quality impacts through turbidity, elevated noise, and minor emissions of air pollutants and greenhouse gases. However, these effects will be temporary and localized and are not expected to be significant.

b. Compliance with Applicable Environmental Laws:

- Clean Water Act, Sections 404 and 401: The proposed action does not include any section 404 regulated discharge and is therefore not subject to 401 water quality certifications. USACE prepared a water quality monitoring plan (WQMP) in the same manner as those previously required in water quality certificates provided by Ecology. The WQMP is attached as Appendix B of the EA and includes details on reporting final data to Ecology and discussing any water quality exceedances as they occur.

- Coastal Zone Management Act: USACE prepared a Coastal Zone Consistency Determination and determined that the proposed action is consistent to the maximum extent practicable (Appendix E of the EA). USACE submitted this consistency determination to Ecology and received conditional concurrence 28 August 2020.

- National Environmental Policy Act: USACE posted a Draft EA for a 30-day public comment period from 8 June 2020 to 8 July 2020. The Draft EA did not contain clear instructions for appropriate point of contact at USACE. The Draft EA was reposted with clear instructions and a seven-day extension of the comment period, ending 15 July 2020.

- Endangered Species Act: USACE submitted a BA for maintenance dredging to the Services. USFWS concurred with USACE's determination of "may affect, not likely to adversely affect" for bull trout and their critical habitat on 12 March 2020. NMFS provided a Biological Opinion on 25 June 2020.

- Magnuson-Stevens Fishery Conservation and Management Act: USACE determined that maintenance dredging of the Federal navigation channel may adversely affect Essential Fish Habitat (EFH). It is because removal of dredged material would constitute a detectable effect to EFH. NMFS provided conservation recommendations

for the protection of EFH due to the assessment of detectable adverse effects. USACE will implement one of the two recommendations and has proposed methods for minimizing effects in lieu of the rejected recommendation (Appendix C of the EA).

- Clean Air Act: Maintenance dredging and disposal activities under this project will result in emissions that are *de minimi.* This action constitutes maintenance dredging where no new depths are required and no new disposal sites are designated, so the project is exempt from any requirement to conform to a State Implementation Plan under 40 CFR 93.153 (c)(2)(ix).

- National Historic Preservation Act: The National Historic Preservation Act (16 U.S.C. § 470) (NHPA) requires that the effects of proposed Federal undertakings on sites, buildings structures, or objects included or eligible for the National Register of Historic Places must be identified and evaluated. USACE Seattle District has reviewed the proposed action and conducted an analysis in accordance with Section 106 of the NHPA's implementing regulations at 36 C.F.R.§ 800. Review of the proposed dredging finds that the activity will have no effect to known archaeological or cultural resources within the area of potential effect. No further archaeological work is recommended. USACE sent a letter to the State Historic Preservation Officer (SHPO) detailing USACE's finding of "no historic properties affected", and the SHPO responded on 13 August 2020 concurring with the USACE's determination of "no historic properties affected" (Appendix F of EA). Tribal notification letters were sent to the Muckleshoot, Snoqualmie, Suquamish, and Tulalip Indian Tribes, and the Yakama Nation. No responses were received related to the presence of cultural resources. This determination completes the NHPA process.

- Tribal Treaty Fishing Rights: Interference with treaty fishing rights will be avoided by performing dredging operations at times that do not conflict with treaty-protected fishing activities. Letters were sent to all Tribes with usual and accustomed fishing rights (U&A) in the area soliciting comments on the proposed dredging and disposal.

- Executive Order 12898, Environmental Justice: Maintenance dredging in the Kenmore Navigation Channel is not expected to result in any disproportionate adverse environmental effects or impacts on the health of minority/low-income populations. Maintenance of the existing navigation project would not negatively affect property values in the area or socially stigmatize local residents or businesses.

- Executive Order 11988, Floodplain Management: USACE has determined that the proposed action is not in the base floodplain, does not increase flood risk, and there is no practicable alternative that meets the project purpose.

6. Determination.

a. Results of the Environmental Analysis for the Kenmore Navigation Channel Maintenance Dredging Project: The EA prepared for this project recommended this FONSI. The proposed project will not constitute a major Federal action significantly affecting the quality of the human environment.

b. Alternatives: Three alternatives were considered in the EA for the Maintenance Dredging of the Kenmore Navigation Channel, dated June 2020: (1) no action, (2) dredging with disposal in a Puget Sound open-water disposal site, and (3) dredging with upland disposal.

The USACE rejected Alternative 1 because it would not meet the project purpose and need. Alternative 2 was rejected due to the inability to conclude that there would be no unacceptable environmental impacts associated with open-water disposal.

c. Individual and Cumulative Environmental Effects: Based on the analysis presented in the EA, the USACE has determined that there will be no significant adverse effects, individually or cumulatively from Alternative 3. Alternative 3 was selected because it would restore the project to congressionally authorized depths, ensuring that safe navigation could continue, and will not result in significant adverse effects.

7. Summary of Impacts and Compliance.

Impacts of the proposed work will be minor and temporary. This project complies with the ESA: A biological assessment addressing the dredging activity has been prepared and was transmitted to the Services. USFWS concurred with USACE's determination of "may affect, not likely to adversely affect" for bull trout and their critical habitat. NMFS did not concur with all USACE's effects determinations of "not likely to adversely affect" but determined that the action would not cause jeopardy to these species. A Biological Opinion and incidental take statement are included in Appendix C of the EA. An EFH determination for the maintenance dredging of the Kenmore Navigation Channel was included in the Biological Assessment submitted to NMFS. USACE has determined that maintenance dredging may adversely affect EFH, because removal of dredged material will constitute a detectable effect to EFH by disturbing the substrate and associated water quality impacts. NMFS recommended two conservation measures in their Biological Opinion and USACE responded with the application of one and alternate methods for meeting the objectives of the other (Appendix C of EA). There will be no discharge subject to Sections 401 and 404 of the Clean Water Act. A consistency determination with the enforceable policies of the Coastal Zone Management Act was provided to the WDOE and conditional concurrence was received 28 August 2020 (Appendix E of EA). The project complies with the NHPA, and USACE has coordinated with the Washington SHPO, the Muckleshoot, Snoqualmie, Suquamish and Tulalip Indian Tribes, and the Yakama Nation.

8. District Engineer's Findings and Conclusions.

I have evaluated the dredging activity and evaluated the following factors as considerations potentially impacting the quality of the human environment in the accompanying EA and coastal zone consistency evaluation: Navigation and the Federal Standard, water quality, coastal zone consistency, wetlands, endangered species, historic resources, scenic values, recreational values, fish and wildlife, and application of non-Federal land use policies. No additional impacts to state/regional/local land use classifications, determinations, and/or policies are anticipated as the project will maintain a federally authorized navigation channel that is already used for vessel transit.

The preferred alternative represents the least costly alternative that is consistent with sound engineering practices and environmental standards. Based on the Final EA, I have determined that the selected action will not have significant effects on the quality of the human environment and does not require preparation of an environmental impact statement.

18 Sept 2020
Date

Alexander "Xander" L. Bullock
Colonel, Corps of Engineers
District Commander

FINAL Environmental Assessment
Kenmore Federal Navigation Channel Maintenance Dredging and Disposal FY2020
King County, Washington

Photo courtesy of Washington State Department of Ecology

US Army Corps of Engineers®
Seattle District

September 2020

Final Environmental Assessment

Kenmore Federal Navigation Channel Maintenance Dredging and Disposal FY2020

Responsible Agency: The responsible agency for this navigation project is the U.S. Army Corps of Engineers, Seattle District.

Abstract:

In accordance with the National Environmental Policy Act, this Environmental Assessment evaluates the impacts of the proposed maintenance of the Kenmore Federal Navigation Channel. The authorized navigation channel is approximately 2,900 feet (ft) long and 100 to 120 ft wide. The channel is adjacent to the Sammamish River at the north end of Lake Washington. The U.S. Army Corps of Engineers (USACE) completed construction of the Kenmore Federal Navigation Channel in March 1981 and performed maintenance dredging in the channel once in 1998. Maintenance need is determined by hydrographic condition surveys, indicating that shoaling (settling of suspended sediments) has altered the channel from the authorized dimensions. The authorized channel depth is 15 ft below low lake level in Lake Washington (equivalent to +20 feet MLLW). The Hiram M. Chittenden Locks at the Lake Washington Ship Canal ("Locks") connects the salt water of Puget Sound to the freshwater of Lake Union and Lake Washington. The Locks provide for transport of commercial cargo vessels as well as recreational vessels. Additionally, the Locks provides for passage of anadromous fish and maintains the level of Lake Washington between +20 and +22 feet MLLW. The authorized navigation channel dimensions allow safe navigation during all lake levels. The purpose for channel maintenance is to support the navigation activities and regular shipping traffic for regional economic development. The channel provides access to the Kenmore Industrial Park, which occupies 97 acres of industrially zoned land. Businesses within the industrial park rely upon the waterway for shipping. Barges are towed between Kenmore and Puget Sound through the Lake Washington Ship Canal. The primary activity is transportation of sand and gravel, as well as materials to produce concrete. Other activities include the operation of seaplanes associated with Kenmore Air, which operates the largest international seaplane facility in the country. To maintain the navigation channel, the USACE proposes to remove up to about 45,000 cubic yards (cy) of accumulated sediment from the navigation channel. Dredging would occur within the in-water work window of 16 November 2020 through 1 February 2021. The dredging will be accomplished using a mechanical clamshell dredge designed to minimize the potential for impacts to the surrounding environment (e.g. excessive turbidity or re-sedimentation). Dredged material will be placed in sealed barges for dewatering and transportation to a transloading site (location to be defined by the Contractor). Dewatering of material will occur in open water near the navigation channel. All dredging and dewatering will be performed in accordance with the water quality monitoring plan (Appendix B) developed

for this project. Transfer to the disposal location will use sealed, non-leaking containers or trucks, in order to meet standards of the water quality monitoring plan or other regulated conditions. Dredging may take up to the 77 days of the in-water work window, depending on total quantity of material removed, mechanical breakdowns, and weather conditions.

THE OFFICIAL COMMENT PERIOD FOR THIS ENVIRONMENTAL ASSESSMENT WAS FROM 8 JUNE TO 15 JULY 2020.

This document is available online as “Kenmore Federal Navigation Channel Maintenance Dredging” http://www.nws.usace.army.mil/Missions/Environmental/Environmental-Documents/

September 2020

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ACRONYMS AND ABBREVIATIONS

BMP	best management practice
CAA	Clean Air Act
cy	cubic yards
CWA	Clean Water Act
D/F	dioxins/furans
DMMP	dredged material management program
DMMU	dredged material management unit
DNR	Washington State Department of Natural Resources
DO	dissolved oxygen
EA	environmental assessment
EFH	essential fish habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ft	feet
FY	fiscal year
kg	kilograms
MLLW	mean lower low water
µg	micrograms
NEPA	National Environmental Policy Act
ng	nanograms
NMFS	National Marine Fisheries Service
USFWS	U.S. Fish and Wildlife Service
USACE	U.S. Army Corps of Engineers, Seattle District
USGS	U.S. Geological Survey

1. Proposal for Federal Action

Under the Council on Environmental Quality regulations, 40 CFR § 1500.1(c) and 40 CFR § 1508.9(a)(1), implementing the National Environmental Policy Act (NEPA) of 1969 (as amended), the purpose of an Environmental Assessment (EA) is to "provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact" on actions authorized, funded, or carried out by the Federal government, and to assist agency officials to make decisions that are based on understanding of "environmental consequences, and take actions that protect, restore, and enhance the environment." This EA evaluates environmental effects of proposed maintenance dredging by the U.S. Army Corps of Engineers, Seattle District (USACE), beginning in the fall of 2020 through 1 February 2021 of the Kenmore Federal Navigation Channel (Kenmore Navigation Channel). The only maintenance dredging was completed by USACE in January 1998, about 17 years post-construction and 22 years ago, currently, and removed 49,126 cubic yards (cy) of sediment.

The Kenmore Navigation Channel is located in King County, Washington. The channel provides a navigable route from deeper waters of Lake Washington to the Kenmore Industrial Park, which occupies 97 acres of industrially zoned land. Barges are towed by tugboats between Kenmore and Puget Sound through the Lake Washington Ship Canal. Deep-draft tugboats, appropriate to the size of the barge load and shipping demand, use the navigation channel to deliver barges to the industrial park. In recent years, shoaling has reduced the depth of the channel, hindering and preventing larger tugboats and other deeper draft vessels access in the channel. Barges must be light-loaded with a reduced quantity of material, in relation to the towing capacity of smaller tugboats able to access the channel. Continued shoaling will continue to reduce the usability of the industrial park and hamper the economic development.

This EA addresses the effects of routine maintenance dredging of the Kenmore Navigation Channel. Dredging will occur once in fall 2020 / winter 2021, and subsequent dredging, to be addressed by additional consultations and assessments, is anticipated to occur approximately every 15-20 years as needed. Dredging is conducted during defined in-water work windows to protect species listed under the Endangered Species Act (ESA). The proposed dredged material has been determined to be unsuitable for aquatic disposal therefore the material will be disposed at an upland location. The scope of activities analyzed for environmental effects in this document are the routine maintenance dredging and transloading of material for disposal at an upland site.

1.1 Project Location

The Kenmore Navigation Channel is located in the northern margin of Lake Washington, approximately 11 miles north of Seattle (Figure 1-1). The navigation channel runs between the Sammamish River and the two marinas, North Lake Marina and Harbour

Village Marina from deeper Lake Washington waters to the Kenmore Industrial Park (Figure 1-2).

Figure 1-1. Project location in Lake Washington near the city of Kenmore, Washington.

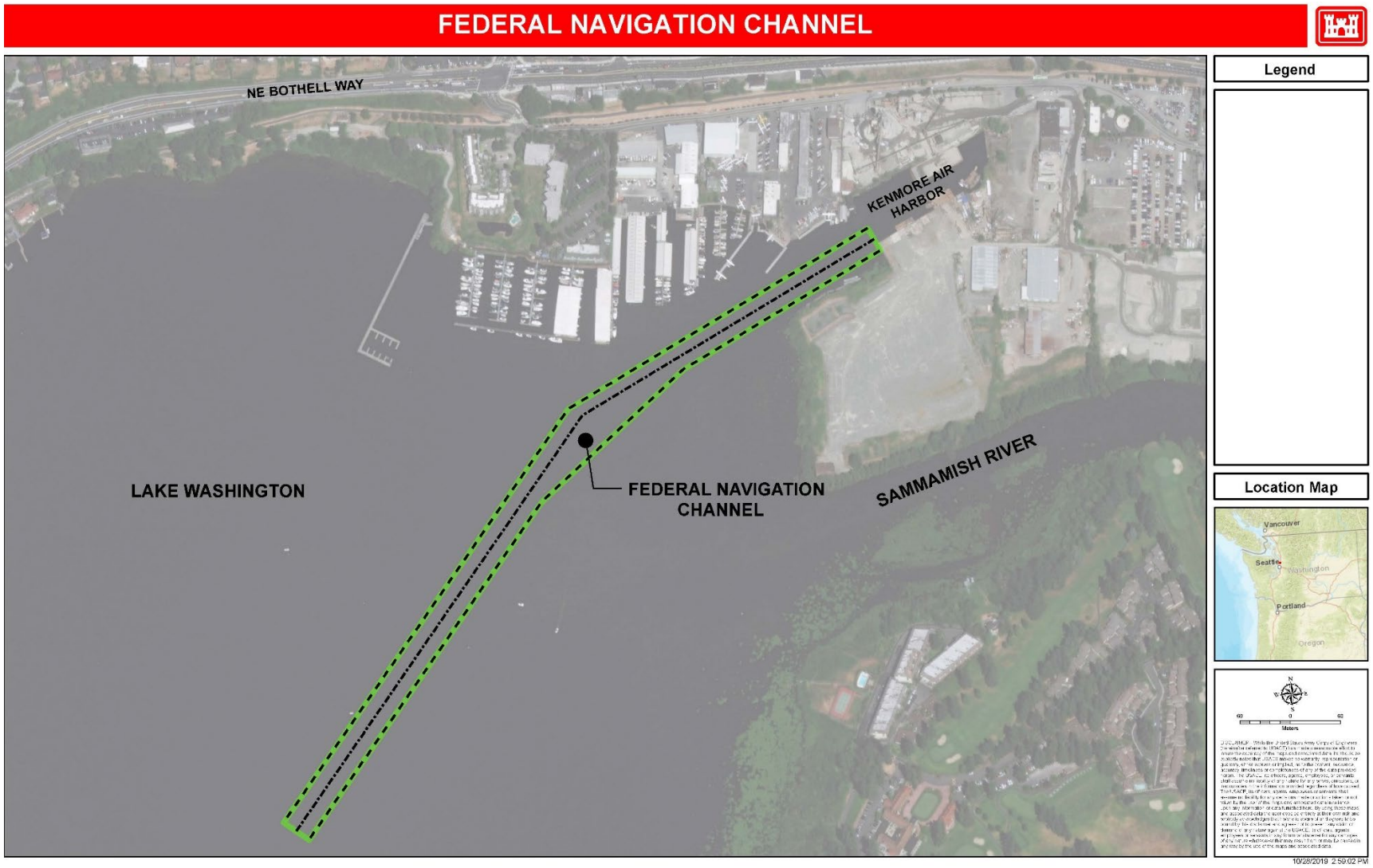

Figure 1-2. Kenmore Navigation Channel.

1.2 Authority

The construction and maintenance dredging of the Kenmore Navigation Channel was authorized by Congress in Section 107 of the Rivers and Harbors Act of 1960.

1.3 Purpose and Need

The purpose of the action is to provide for safe navigation by maintaining the authorized depth for navigation access to the Kenmore Industrial Park, which occupies 97 acres of industrially zoned land. Businesses within the industrial park rely upon the waterway for shipping. Barges are towed by tugboat between Kenmore and Puget Sound through the Lake Washington Ship Canal. The primary activity is transportation of sand and gravel, as well as materials to produce concrete. Other activities include the operation of seaplanes associated with Kenmore Air, which operates the largest international seaplane facility in the country. The purpose for channel maintenance is to support the navigation activities and regular shipping traffic for regional economic development.

The tugboats used to transport barges require the full authorized channel depth of 15 ft below low lake level in Lake Washington (equivalent to +20 feet mean lower low water (MLLW)). As shoaling has reduced the depth of the channel, the deep-draft tugboats have not been able to access the channel. Barges must be light-loaded with a reduced quantity of material, in relation to the towing capacity of smaller tugboats able to access the channel. Maintenance need is determined by hydrographic condition surveys, indicating that shoaling (settling of suspended sediments) has altered the channel from the authorized dimensions required for safe navigation of commercial vessels. The most recent survey, performed 16 July 2018, indicated areas of the channel were more than two feet above the authorized elevation.

2. Proposed Action and Alternatives

According to the identified need for maintenance dredging, USACE formulated, evaluated, and screened alternatives for determining the action that qualifies as the Federal Standard or preferred alternative. The Federal Standard is defined in USACE regulations as the least costly alternative that is consistent with sound engineering practices and meets all federal environmental requirements. This chapter describes the range of alternatives that were evaluated and screened for selection of the preferred alternative and identifies the preferred alternative that was selected.

2.1 Alternative 1 – No Action

The No-Action Alternative is analyzed as the future without-project conditions for comparison with the action alternatives. If the USACE takes no action to remove sediment above authorized project depth from the Kenmore Navigation Channel, continued shoaling would pose increasing risk to tugboats and other deep-draft vessels that may run aground when transiting the channel. Eventually, accumulated sediments would reduce the depths of the channel, greatly restricting use by deep draft vessels. This would

have a negative effect on the local maritime economy and the businesses associated with the Kenmore industrial park. This alternative would not meet the project purpose and need but is carried forward for evaluation purposes.

2.2 Alternative 2 – Dredging and Open-Water Disposal in Puget Sound Disposal Site

The Kenmore Navigation Channel would be dredged to its authorized depth with allowable overdepth with disposal of the dredged material at the Elliot Bay open water disposal site. The project consists of removing up to 45,000 cy of material dredged (estimated total is 34,350 cy) from station 0+00 to station 33+00 of the main channel to its authorized depth of 15 feet below low lake level (+20 feet MLLW), plus two feet of allowable overdepth. Quantities are estimated conservatively for environmental impacts analysis and include the amount of allowable overdepth. Survey data from July 2018 indicate accumulation above the authorized mudline elevation (Figure 2-1). Accumulated sediments are predominantly silt with sand.

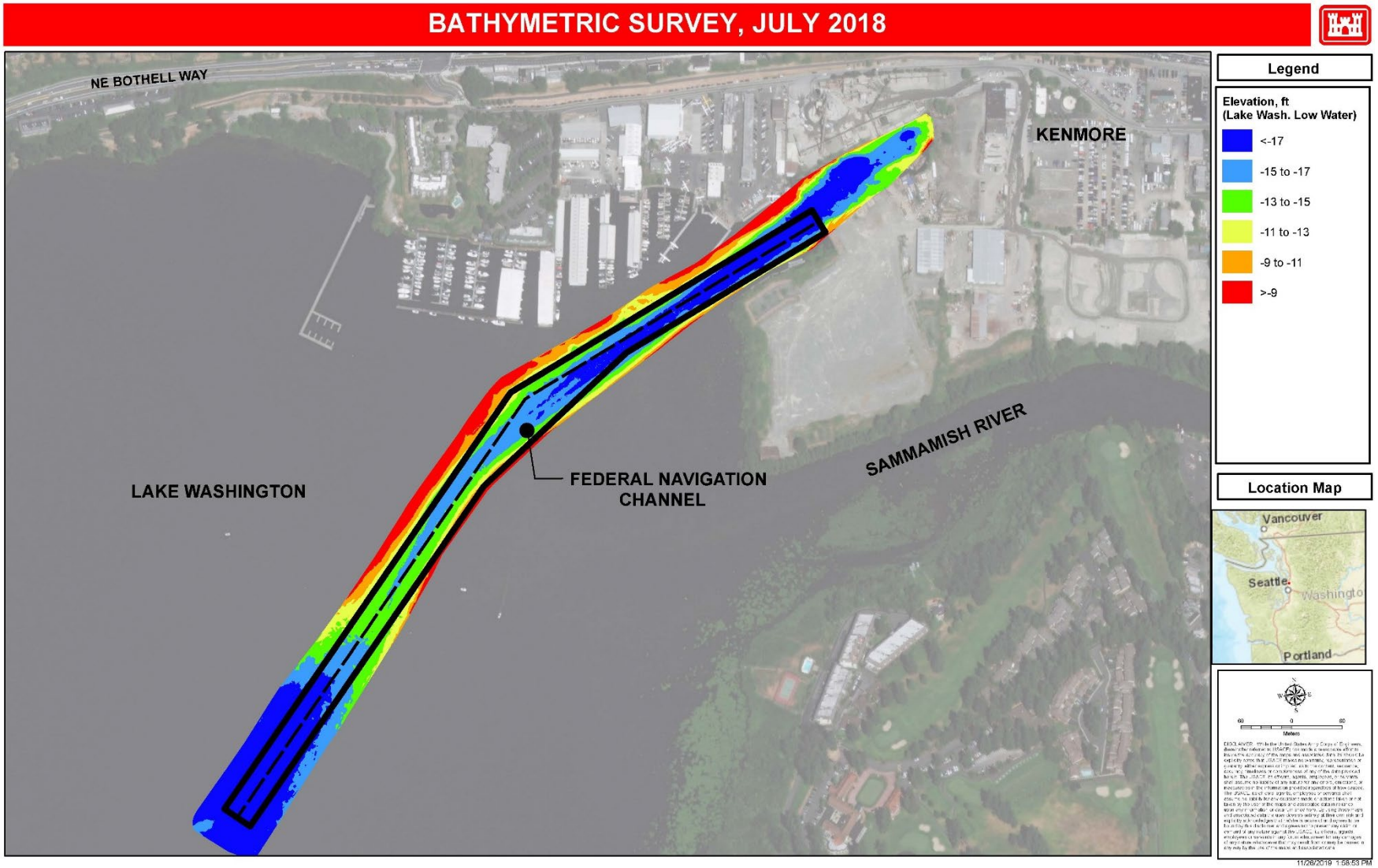

Figure 2-1. 2018 bathymetric survey of Kenmore Federal Navigation Channel.

Dredging may take up to 77 days, depending on total quantity of material removed, mechanical breakdowns, and weather conditions. The dredging project will occur up to 24 hours per day, seven days per week. The USACE approved in-water work window for northern Lake Washington is 16 July through 31 July and 16 November through 1 February to protect migrating salmonids (USACE 2013). 2020 dredging activities are anticipated to be scheduled during the fall/winter work window (16 November 2020 – 1 February 2021), pending any updates to tribal fishing needs. USACE will coordinate with potentially affected Tribes prior to finalizing the work schedule.

A clamshell dredge operation includes a dredge barge with a deck-mounted crane, a clamshell bucket, at least one tugboat, and at least one sediment transport barge. During active dredging, a transport barge is tied to the dredge barge. The clamshell dredge (a type of mechanical dredge) utilizes a bucket deployed by a crane, mounted on a dredge barge, to remove the sediment. The bucket is sufficiently heavy to sink into the substrate. The dredge bucket has two jaws that are hinged in such a fashion that the bucket is open while descending through the water column (Figure 2-2). There are a variety of bucket types designed for different substrate conditions, and best management practices (BMPs) call for the use of a bucket designed to minimize the potential for impacts to the surrounding environment (e.g. excessive turbidity or re-sedimentation). After closing, the top portion of the bucket remains open as the bucket is retrieved. A “controlled lowering” of the bucket reduces turbulence and the amount of suspended sediment generated. After the bucket penetrates the substrate, the bucket is closed, taking a “bite” out of the substrate. The bucket is retrieved and swung over to a transport barge where the sediment is placed for transport to a disposal site. With the top and/or bottom of the bucket open, the probability of catching and retaining mobile organisms is minimal.

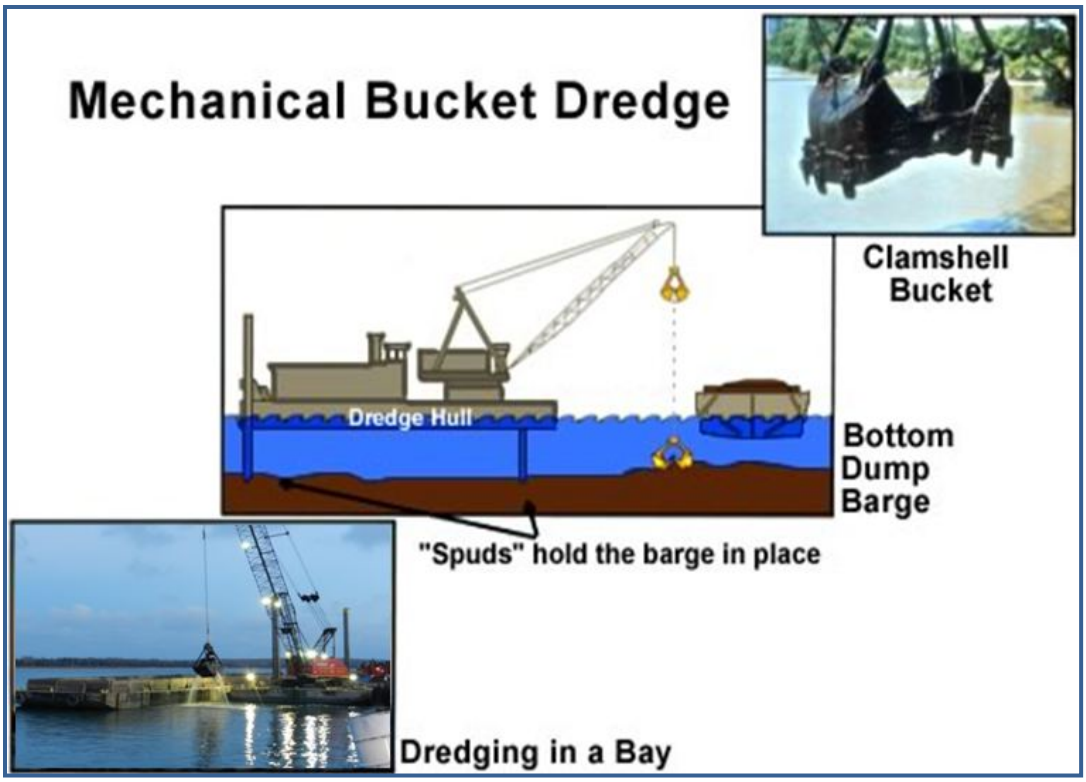

Figure 2-2. Rendering of a mechanical dredge barge and bottom dump barge, with photographs of a mechanical (clamshell) dredge bucket and an operating mechanical dredge barge.

The dredge barge is equipped with vertical steel pipes, called spuds that are sunk into the substrate to anchor the dredge barge in one location. To move the dredge barge, the spuds are retrieved, and a tug moves the dredge barge to a new location. The spuds are again sunk into the substrate to secure the dredge barge and dredging continues. Dredge barges are not self-propelled, but some dredge barges can, on occasion, move short distances by setting the dredge bucket into the substrate, retrieving the spuds, then pulling on the dredge bucket cable, and then inserting the spuds in the new location.

Disposal at the Elliot Bay Puget Sound dredged material disposal site is subject to analysis by the dredged material management program (DMMP) agencies (USACE, Washington State Department of Ecology (Ecology), US Environmental Protection Agency (EPA), and Washington State Department of Natural Resources (DNR)). Potential dredge material was tested according to the DMMP guidance and found to be unsuitable for disposal for open-water disposal. Due to irregularities in the larval development bioassay, it was not possible to eliminate the influence of non-treatment effects on the test results (Appendix A). Because of these confounding effects, DMMP agencies were not able to make a decision regarding the suitability of the dredged material and concluded that, provided the current data, the material must be considered unsuitable for open-water disposal. Therefore, the analysis does not consider open-water, or aquatic, disposal as an alternative action that would meet the environmental requirements of the Federal Standard.

2.3 Alternative 3 – Dredging and Upland Disposal

Under this alternative, dredging would occur as described for Alternative 2, but material would not be disposed of in open-water. Sediments in the navigation channel have been determined to be unsuitable for aquatic disposal due to bioassay results and therefore the material will be disposed of at an upland location. Dredged material will be placed in a sealed barge for dewatering and transportation to a transloading site. Dewatering of material will occur in open water near the navigation channel.

Transloading and upland disposal sites are to be identified by the dredging contractor with final approval of sites and plans by USACE. Implementation of dredging best management practices (BMPs) will be guided by the monitoring of turbidity as detailed in the water quality monitoring plan (WQMP) (Appendix B). Transfer to the disposal location will use sealed, non-leaking containers or trucks, as defined by BMPs or other regulated conditions.

Dredging will be performed within the established navigation channel and no expansion of the channel or creation of new channel(s) will occur. Therefore, actions will only involve previously disturbed benthic habitat. The following conservation measures and BMPs will be implemented to reduce the impacts to ESA-listed species:

Conservation Measures

- Any disturbance of the upland area by transloading activities or equipment, will be restored to the original pre-project conditions upon the immediate completion of construction.
- Existing habitat features such as native vegetation and large wood will be retained on-site to the extent possible.

Best Management Practices

The following BMPs are intended to avoid and minimize impacts to aquatic species and the natural environment from dredging and transfer-related effects such as underwater noise or suspended sediment:

- In-water work will be limited to the in-water work window (16 November to 1 February), which would not interfere with tribal fisheries, and is outside the known migration periods for adult Chinook and mostly avoids juvenile migration periods. There is a very low potential for late migrating coho in northern Lake Washington through November.
- Project is limited to specific authorized dimensions and will be executed within the Congressional authority for the project.
- Maintenance dredging is conducted based on the results of site-specific, current hydrographic condition surveys conducted for each dredging event.

- USACE will use a clamshell (mechanical) dredge, where project requirements allow this equipment, to minimize the possibility of entraining or otherwise harming ESA-listed species.
- USACE obtained a suitability determination of the sediment following DMMP protocols for sediment disposal and places material at the appropriate designated disposal sites. Material determined unsuitable for open-water disposal is disposed at appropriate upland sites.
- USACE coordinates dredging projects with the local Indian Tribes that have usual and accustomed fishing rights in each project area.
- Clamshell dredging operations are conducted in a manner that minimizes spillage of sediments from the dredge bucket and transport barge.
- Clamshell bucket will be raised and lowered through the water column at a slow rate to minimize turbidity increases, if monitoring results indicate this BMP is needed to avoid an exceedance.
- Bucket is only filled to capacity – bucket is not overfilled.
- Bucket is paused at the surface, after its ascent through the water column, to minimize turbidity by allowing free water to drain from the bucket prior to swinging the bucket to the scow.
- Careful placement of material from a clamshell bucket into a barge to limit splash and prevent spillage.
- Once the material has been removed, the dredged material will not be dumped back into the water.
- Barges used to transport the dredged material to the disposal or transfer sites will not be filled beyond their capacity and will completely contain the dredged material.
- Equipment holding dredged material will be sealed to prevent losses during transit.
- Dredging bucket utilized for digging should be designed to minimize turbidity while dredging.
- Transfer locations will be established to confine any accidental spillage and prevent releasing dredged material back into the environment.
- Equipment used near and in the water will be cleaned prior to construction.
- The contractor will take care to prevent any petroleum products, chemicals, or other toxic or deleterious materials from construction equipment and vehicles from entering the water.
- A spill containment kit, including oil-absorbent materials will be kept on-site during construction in the event of a spill or if any oil product is observed in the water. If a spill were to occur, work would be stopped immediately, steps would be taken to contain the material, and appropriate agency notifications would be made.

- Turbidity will be monitored to ensure construction activities are in conformance with the protocols and criteria in the project specific WQMP (Appendix B).

2.4 Preferred Alternative Selection and Alternatives Eliminated from Further Consideration

The USACE rejected Alternative 1 because it would not meet the project purpose and need. Alternative 2 is substantially less costly than Alternative 3, but sediments do not meet environmental standards required for open-water disposal and therefore the alternative must be rejected. Alternative 2 was not carried forward for detailed analysis because it was not a viable option. Alternative 3 meets the Federal standard and is consistent with sound engineering practices that meet environmental standards and is carried forward for detailed analysis. While the No Action Alternative (Alternative 1) is not recommended, it is carried forward for further evaluation to serve as a base condition for evaluation of other alternatives.

3. Issues for Comparison of the Alternatives

This section provides information on the existing conditions of resources within the project area and issues relevant to the decision process for selecting the preferred alternative. Existing conditions are the physical, chemical, biological, and socioeconomic characteristics of the project area. Factors for selecting the preferred alternative include considering which of the alternatives would be the least costly, environmentally acceptable, consistent with engineering practices, and meets the purpose and need of the project. Table 3-1 identifies the resources evaluated for detailed analysis with a rationale for inclusion or exclusion. Resources were excluded from detailed analysis if they are not potentially affected by the alternatives or have no material bearing on the decision-making process.

Table 3-1. List of resources considered for detailed effects analysis and rationale for inclusion or exclusion.

Resource	**Included in Detailed Analysis (Y/N)**	**Rationale for inclusion or exclusion**
Hydraulics and Geomorphology	Y	Alteration of the bathymetric condition may affect local hydraulics and geomorphology. The proposed action requires study of these characteristics.
Groundwater	N	The proposed action is limited to the subtidal environment. No groundwater would be affected.

Resource	Included in Detailed Analysis (Y/N)	Rationale for inclusion or exclusion
Water and Sediment Quality	Y	Analysis is required to determine the intensity of potential changes to the condition of water and sediments in and around the project location.
Vegetation	Y	Aquatic vegetation exists in the nearshore of Lake Washington, although unlikely in the navigation channel.
Fish	Y	Many different fish species may be present. Analysis is required to determine which species would be present, the intensity of effects, and how to avoid or minimize effects.
Wildlife (mammals and birds)	Y	Mammals that may occur in the study area include river otters, raccoons, and rodents. Bird species present are also likely to be those well habituated to human activity and development. Noise and turbidity from construction may be temporarily disruptive.
Benthic Invertebrates	Y	Benthic macroinvertebrate populations are known to recover quickly from the type of action proposed, but community structure can change under disturbance regimes. Significant negative effects are not anticipated, but analysis is required to determine intensity of effects.
Threatened and Endangered Species	Y	The proposed action may affect ESA-listed species in the study area. Analysis is required to determine the intensity of effects and how to avoid or minimize impacts.
Cultural Resources	Y	Analysis is required to investigate cultural resources and to determine the extent of any potential effects.
Tribal Treaty Rights	Y	The study area is within treaty-reserved fishing areas, called Usual & Accustomed areas. No substantial negative effects are anticipated, but analysis is required to avoid and minimize effects.
Air Quality	Y	The air-pollutant concentrations in the study area have consistently been below the National Ambient Air Quality

Resource	Included in Detailed Analysis (Y/N)	Rationale for inclusion or exclusion
		Standards; however, an analysis of pollutants emissions from construction is necessary to disclose to the public.
Greenhouse Gas Emissions	Y	Emissions that would occur during construction are analyzed for impacts.
Noise	Y	The action has the potential to impact sensitive noise receptors during construction, including fish and wildlife. Analysis is required to determine the intensity of effects. Noise will be evaluated under the fish and wildlife sections. Impacts to human receptors will be minimal to none given the dredging will occur in an industrial/commercial area where ambient noise is high (commercial vessels and seaplanes).
Hazardous, Toxic, and Radiological Waste	N	The most recent sediment suitability determination indicated that proposed dredge materials do not meet criteria for aquatic disposal. Dredged material will be disposed of at an upland location. Potential impacts will be evaluated under the sediment section.
Invasive Species	N	Maintenance dredging would not increase the number of vessels entering Kenmore, nor would the origin of the vessels change. Introduction of invasive species from outside sources in not a concern.
Aesthetics	N	The proposed action would have no permanent effect to scenic resources or visual characteristics of the study area.
Recreation Resources	Y	Recreational resources within the study area may be temporarily impacted during construction. Analysis is required to determine the intensity of effects.
Public Services and Utilities	N	The proposed action would have no substantial effect on electricity, water, wastewater and stormwater collection,

Resource	Included in Detailed Analysis (Y/N)	Rationale for inclusion or exclusion
		sewer and solid waste, natural gas, oil/petroleum, or telecommunications services.
Socioeconomics	Y	A purpose of the project is to maintain safe navigation for commercial and industrial uses, thus maintaining affected economies.
Public Health and Safety	Y	The proposed dredging will improve safe navigation. All material is will be disposed of at an appropriate upland location.
Land-based Transportation and Traffic	N	None of the alternatives would cause changes to local traffic or surface transport of import and export goods and commodities.

3.1 Hydraulics and Geomorphology

The Cedar River – Lake Washington watershed includes the Cedar River to the south and receives the output of the Sammamish River at the northern margin. Lake Washington and the Sammamish River were substantially altered by the construction of the Lake Washington Ship Canal connecting Lake Washington to the Puget Sound rather than the historic connection via the Black River. Lake Washington was lowered by approximately 9 feet. Shallow water habitat became dry ground, and the overall surface area of the lake was reduced. Lake Washington generally lacks complex shoreline habitat or structure features such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

The historic Sammamish River corridor contained vast wetlands with many meandering and braided channels (Tetra Tech, Inc. 2002). The river is low gradient (average bed slope of 0.019 percent below transition from Lake Sammamish, King County 2012) with substantial amounts of fine material within the substrate. Since the 1880s, the diverse assemblage of wetland, riparian, and old-growth forest habitats has been reduced to a single, channelized river disconnected from floodplain or wetland habitat.

3.1.1 Alternative 1 – No-Action

Under the No-Action alternative, sediment would continue to accumulate in the navigation channel. Shoaling of sediment would continue to hamper vessel passage to and from the

Kenmore industrial park. Continued shoaling would result in less water depth throughout the channel and, if allowed to continue unimpeded, could reduce or eliminate vessel traffic.

3.1.2 Alternative 3 – Dredging and Upland Disposal

Maintenance dredging would return the channel to its authorized depth of 15 ft plus two feet of overdepth. Safe access would likely continue over the next 15 years if previous trends in sedimentation persist. The channel may act as a sink for sediments being deposited at the mouth of the Sammamish River, but effects are anticipated to be negligible.

Water movement in the area is highly modified and regulated compared to historic conditions due to the construction of the Lake Washington Ship Canal and the flood management and development actions along the Sammamish River. The dredging of accumulated sediments from the navigation channel will not alter the existing water movement processes. Maintenance of the channel is not likely to significantly affect the hydraulics or geomorphology outside of the channel.

3.2 Water Quality

The Sammamish River contributes 27 percent of the hydraulic load to Lake Washington, and, while Lake Washington is noted as 'exceptional' for a large urbanized lake (King County 2020), Sammamish River water has been considerably degraded. The river is on Ecology's 303(d) list of impaired waterways due to seasonally high water temperatures and low dissolved oxygen levels (Ecology 2020a). Lake Washington is designated by Ecology as core summer salmonid habitat with corresponding temperature criteria of not to exceed a 7-day average of daily maximum temperatures of 16°C. Lack of large vegetation (trees and large shrubs) in the riparian zone has been cited as a significant cause of elevated temperature in the Sammamish River. Due to heavy industrial and agricultural use, there is a near complete lack of riparian trees along the shoreline of the lower Sammamish River. Dissolved oxygen levels correlate to water temperatures as colder water can contain greater quantities of dissolved gases. Lake waters often are stratified with warmer water on the surface. Conditions vary over the year, but dissolved oxygen concentrations can be much reduced at depth. Therefore, the State water quality criteria for lakes are related to the natural site conditions. Temperature is not to be increased more than 0.3 °C over the 7-day average of daily maximum temperatures. Dissolved oxygen concentrations may not decrease by more than 0.2 mg/L below natural conditions. Measurements of conditions in Lake Washington vary substantially throughout the year (Figure 3-1).

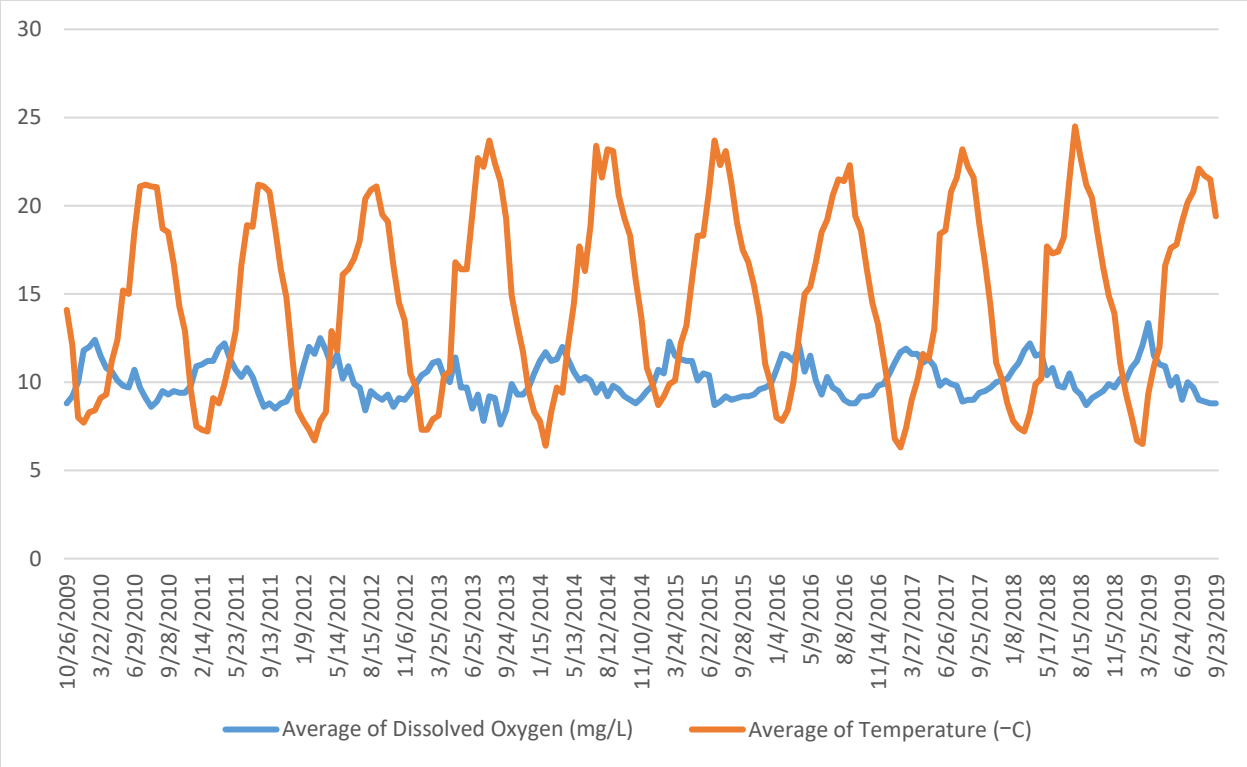

Figure 3-1. Temperature and dissolved oxygen levels in northern Lake Washington (King County 2020).

Turbidity is often a concern for dredging operations depending upon the background turbidity in the environment and the nature of the sediments being disturbed (likelihood of being suspended in the water column). Turbidity and water clarity measurements are related but not equivalent values, and there are a variety of methods for measuring each. Water clarity, as measured by the depth at which a Secchi disk is still visible, in northern Lake Washington has varied between less than one to greater than eight meters of visibility (Figure 3-2) (King County 2020). Water tends to get clearer over the summer with peak clarity in the fall. Visibility depths decreased as water runoff and winds in late fall and winter likely increased suspended solids in the water column. Direct measurements of turbidity near the middle of Lake Washington showed little variability for the majority of the year 2019 (Figure 3-3). Turbidity, measured as NTU, was generally around 1.0 NTU with occasional, short term increases above 2.0.

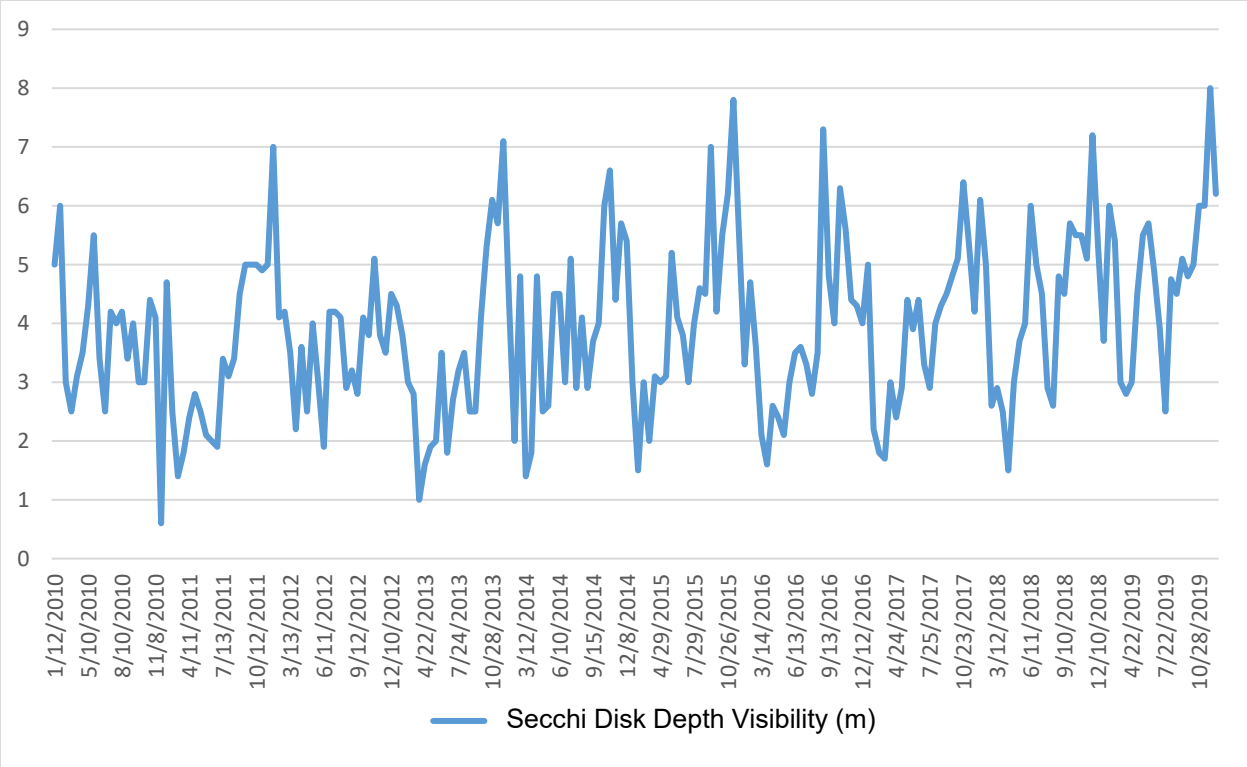

Figure 3-2. Water clarity in northern Lake Washington (King County 2020).

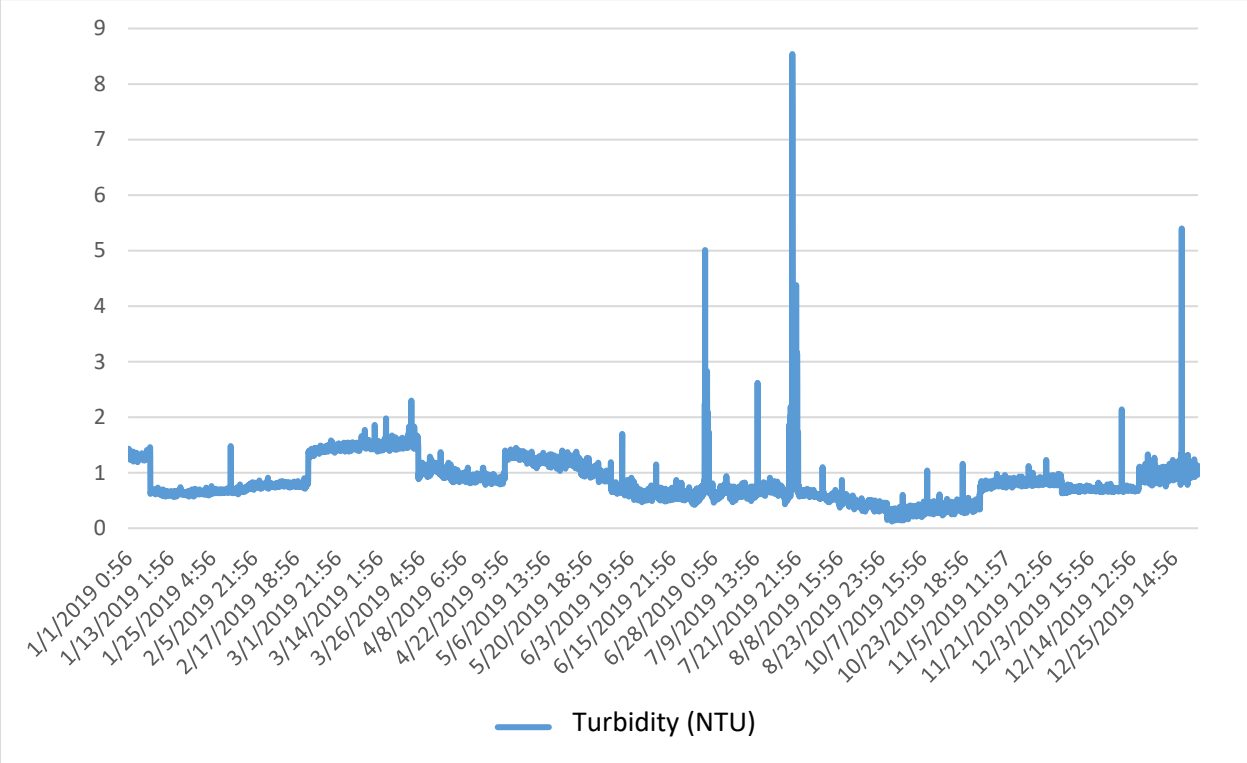

Figure 3-3. Turbidity measurements near center of Lake Washington 2019 (King County 2020).

3.2.1 Alternative 1 – No-Action

The No-Action Alternative would have no effect on the water quality in northern Lake Washington.

3.2.2 Alternative 3 – Dredging and Upland Disposal

This alternative would have a minor and short-term impact on water quality conditions in the vicinity of the dredging equipment. Expected effects include a small reduction in dissolved oxygen and increase in turbidity. No effects to temperature are anticipated.

Sediment suspension during dredging can result in localized and temporary reduction of dissolved oxygen (DO), primarily due to fine-grained, anaerobic sediments that create an oxygen demand when suspended. Temporary decreases in DO associated with increased suspended sediments are possible in the immediate dredging plume area. Short-term effects of decreases in DO could include avoidance of the dredging area by mobile aquatic organisms, and reduced foraging opportunity during and immediately after dredging as fish avoid areas of depressed DO. Fish may avoid the area for foraging due to other disturbances such as noise.

Dredging operations would cause turbidity due to short-term resuspension of sediments in the water column; the amount of resuspended sediment would decrease with distance from the dredging. Proposed dredge material is comprised mainly of fine material (greater than 50 percent silt and clay), which is more likely to remain in suspension than coarse material. A WQMP has been developed to guide the implementation of BMPs for the preservation of water quality (Appendix B). This includes reviewing existing BMPs and those yet to be implemented, confirming exceedances with additional testing, or increasing monitoring to confirm the turbidity level has dropped. In some cases, dredging may be suspended until turbidity levels have been reduced or an environmental source of turbidity (e.g., heavy rains) can be confirmed. Turbidity will be kept within industry standards, also approximately within the natural range measured in Lake Washington (Figure 3-3). Industry standard, adopted from Ecology guidance (WAC 173-201A-200), is an increase of 5 NTU (nephelometric turbidity units) above background levels. USACE anticipates maintaining these turbidity levels at a distance not to exceed 150 ft from the dredging action.

These water quality effects would not be considered significant because they would:

- maintain conditions similar to the measured range of DO and turbidity;
- be confined to a small area immediately surrounding the channel;
- not extend beyond the time required for dredging;
- and would be mitigated for by the implementation of BMPs as indicated by the WQMP.

3.3 Sediment Quality

The DMMP agencies evaluate the suitability of dredged material for disposal at aquatic sites through sediment characterization (DMMP 2018). Sediments are mostly a homogenous, fine grained material (greater than 50 percent silt and clay) that has been deposited since maintenance dredging of the channel in 1998 and since construction in 1981 in areas not part of the maintenance dredging.

Sediment characterization was performed in 2019 according to DMMP guidance. Forty-five sediment cores were collected and composited into 9 samples, each representing a Dredged Material Management Unit (DMMU) as shown in Suitability Determination Memorandum (SDM) Figure 2 (Appendix A). Each sample was analyzed for the DMMP chemicals of concern plus dioxins/furans (D/Fs) and tributyltin.

DMMUs with chemical concentrations present at levels above the screening level (SL) require biological testing before a decision can be made on the suitability for unconfined, open-water disposal. Bioaccumulative compounds are also screened against a "bioaccumulation trigger" (BT). If any chemical of concern exceeds the BT guideline value, additional information gained via bioaccumulation testing is required in order to determine whether dredged material is suitable for unconfined, open-water disposal.

Chemical results for the 9 samples are provided in SDM Tables 5 and 6 with key information summarized below:

- Butyl benzyl phthalate was above the SL of 63 micrograms per kilogram (µg/kg) in two DMMUs (92.9 and 70.7 µg/kg). The standard suite of three marine bioassay tests were triggered for these two samples.
    - Both DMMUs passed the amphipod and juvenile polychaete tests. The larval development test was considered inconclusive due to several irregularities encountered during the testing, specifically with acclimation of freshwater sediment to marine conditions.
- Chlordane initially had no detected exceedances of SLs but had elevated detection limits due to matrix interference. 4,4'-DDE also had a non-detect exceedance of the SL due to elevated reporting limits in one DMMU. Eight of the 9 DMMU samples were reanalyzed by a high-resolution mass spectrometry method that provided lower detection limits. In the reanalyzed samples, 4.4'-DDE was not detected in the sample below the SL and chlordane was slightly above the SL of 2.8 µg/kg in all eight samples (concentration range of 2.92 to 3.66 µg/kg). All concentrations were J-flagged, indicating that they are estimated concentrations. The laboratory noted that these concentrations were below the lowest calibration standard.
    - The reanalyzed data was received well after the bioassay holding time had expired, so further bioassay testing could not be triggered with the existing sediment.

    - The Washington State Sediment Management Standards does not have Sediment Quality Standards for pesticide compounds, the SL is only applicable to the open-water disposal sites.
- D/Fs, which pose a bioaccumulation risk, exceeded the disposal site management objective of 4 nanograms/kg (ng/kg) toxicity equivalents (standard method for summing all D/F congeners to evaluate potential toxicity) in all DMMUs and exceeded the BT in two DMMUs.
    - Bioaccumulation was run on the DMMU with the highest concentration and a "supercomposite" of the other 8 DMMUs. Both test sediments were determined not to be a significant bioaccumulation impact to the disposal site and were approved for open-water disposal.

In summary, only three chemicals exceeded the DMMP open-water disposal SL (and BT for D/Fs). The bioaccumulative D/Fs were determined not to be a significant bioaccumulation impact to the disposal site. The bioassay tests were triggered to assess benthic toxicity of the other two compounds that slightly exceeded SLs (butyl benzyl phthalate and chlordane). The 10-day amphipod mortality and 20-day juvenile infaunal growth test assessed acute and chronic toxicity, respectively, and passed. The inconclusive larval development test led to the DMMP agencies' decision to deem the larval test results invalid. Without the full suite of bioassay test results, the DMMP agencies were unable to determine that the proposed dredged material was suitable for open-water disposal. None of this data substantiates toxicity during dredging; only the suitability of the material for placement at the marine open-water disposal site in Elliott Bay.

Sediments exposed by dredging are also evaluated according to DMMP guidance (DMMP 2008). Testing was completed in 2014 and included analysis of freshwater bioassays due to elevated nickel throughout the project. Nickel is considered to have an elevated natural background in the area (RSET 2015). All samples passed bioassay testing. The DMMP agencies reviewed the previous testing results and determined the results were still valid for deep sediments that have been undisturbed since the 2014 testing.

Therefore, the sediment to be exposed by dredging is not considered to be degraded relative to the currently exposed sediment surface. On this basis the DMMP agencies concluded that this project is in compliance with the State of Washington anti-degradation policy.

3.3.1 Alternative 1 – No-Action

The No-Action Alternative would have no effect to sediment quality in the navigation channel or northern Lake Washington. This alternative would allow sediment to continue accumulating, which would eventually jeopardize the ability for safe navigation through the channel. This alternative would not meet the project purpose and need because the

Kenmore Navigation Channel would not maintain its authorized depth as regularly performed bathymetric surveys have shown.

3.3.2 Alternative 3 – Dredging and Upland Disposal

USACE anticipates a minor movement of sediments via suspension during the process of placing the dredge bucket on the sediment surface and retrieving it through the water column. Based on past monitoring, the USACE expects that dredging will produce only a minor amount of suspended sediments and the material will disperse and settle through the water column. The material will likely be undetectable or in a thin layer, and largely back within the navigation channel.

As summarized in the SDM, the sediments exposed by dredging have been evaluated and are similar to the natural, background condition of the area. The deeper exposed sediments are likely to be anaerobic and cause a reduction in dissolved oxygen levels in waters near the surface of the sediment. The USACE anticipates that any temporary localized reduction in ambient DO would not be sufficient to cause detrimental effects on the demersal and infaunal communities in nearby areas because the effects would quickly dissipate beyond a thin layer of water above the most recently dredged location. Furthermore, there would be few organisms in the area to be impacted. Benthic organisms will be removed by the dredge bucket and mobile organisms are likely to avoid the area due to the disturbance.

This alternative would maintain the navigation channel at its authorized depth. The direct effect of this alternative on sediments would be removal of accumulated surface sediments and exposure of underlying sediments to the water of Lake Washington and the Sammamish River. Project sediment characterization and past monitoring data indicate that the action would not alter the nature of the benthic habitat within or around the Kenmore Navigation Channel. Benthic organism populations within the channel are likely to return to pre-dredge status over a few seasons (approximately 6 – 9 months).

3.4 Vegetation

The dominant aquatic vegetation within the Kenmore Navigation Channel are the white-stemmed pondweed and tapegrass (Figure 3-4, from Herrera 2017). However, densities in and near the channel are very low to zero, potentially due to the regular vessel traffic within the channel (Figure 3-5, from Herrera 2017).

Widespread growth of noxious weeds is an ongoing concern for Lake Washington and the City of Kenmore in particular. Three aquatic noxious weeds (Eurasian watermilfoil, Brazilian Egeria, and fragrant waterlily) and two emergent weeds (garden and purple loosestrife) are identified for control (Herrera 2017). The weeds interfere with commercial and recreational uses including swimming, kayaking, boating, and others. Residents and business owners along with aquatic plant biologists and management experts have created an Integrated Aquatic Vegetation Management Plan, which is funded by a WA

Ecology grant. Physical removal and prevention via bottom barriers as well as chemical control (selected herbicides include glyphosate, triclopyr, imazapyr, and diquat) measures will be applied.

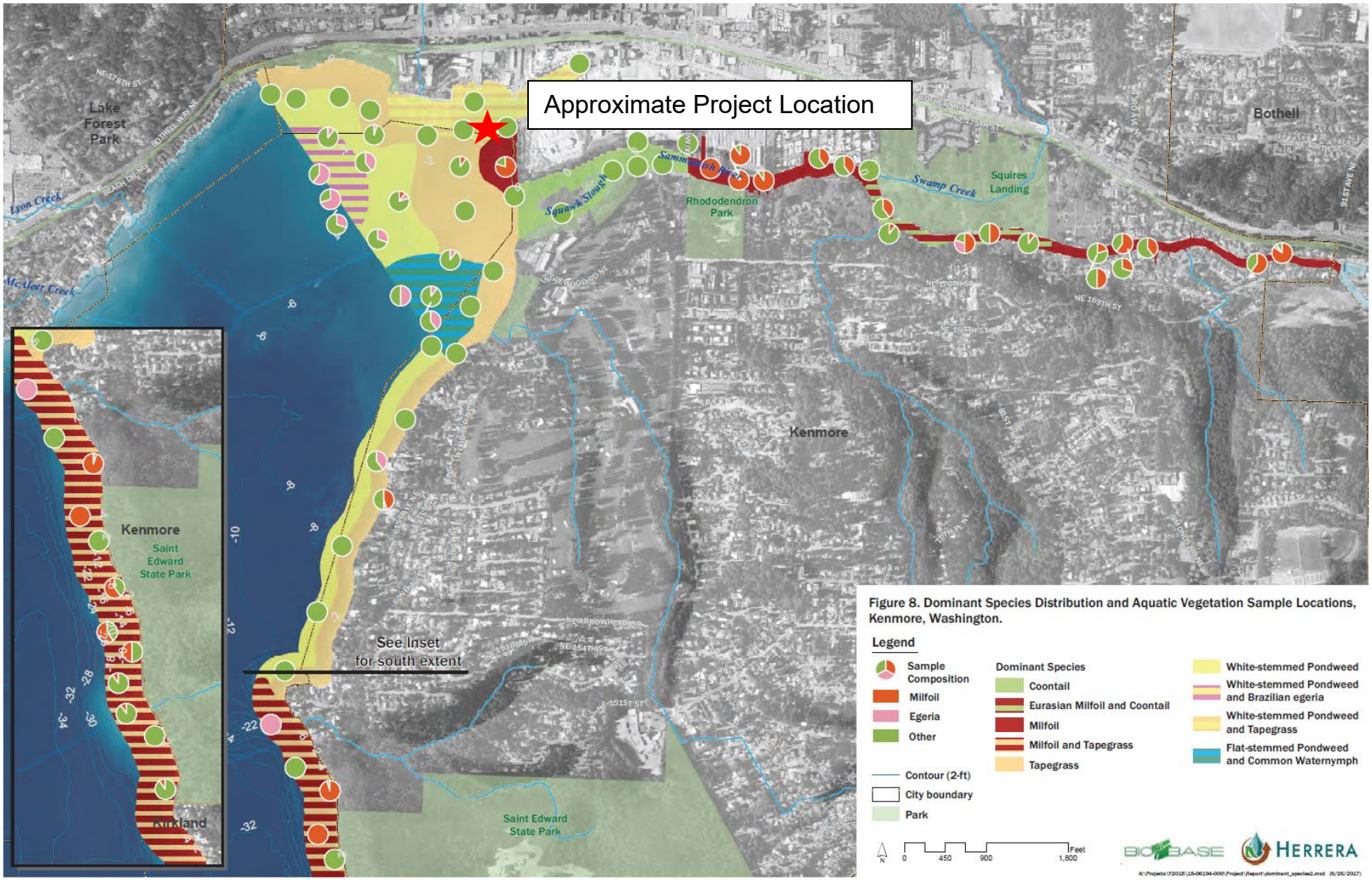

Figure 3-4. Aquatic vegetation in waters of Kenmore, Washington.

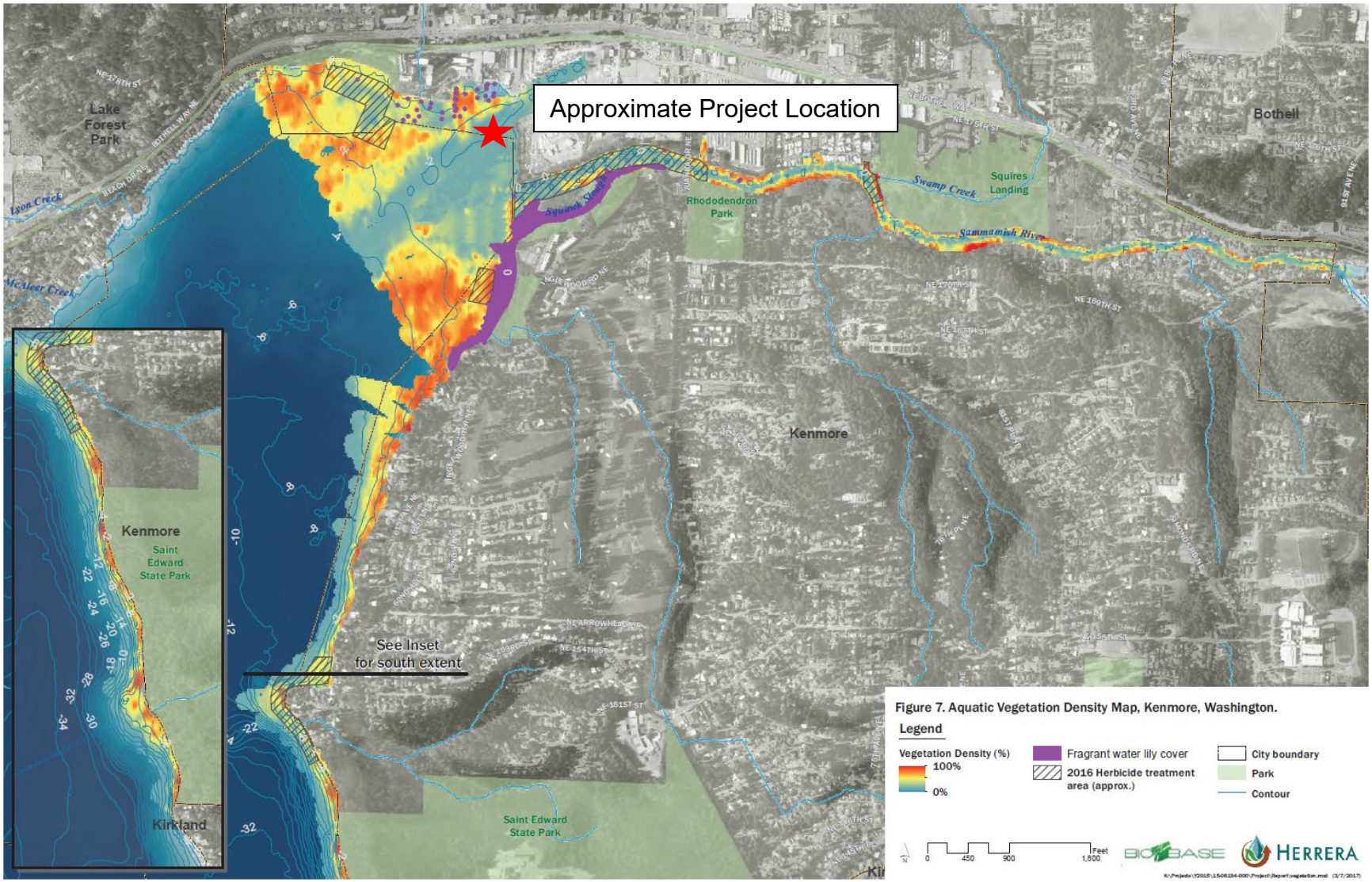

Figure 3-5. Density of aquatic vegetation.

3.4.1 Alternative 1 – No-Action

The No-Action Alternative would have no effect to any vegetation or tidal wetlands in the project area. Commercial and recreational vessels would continue to use the area and reduced amounts of vegetation would continue to grow in the project area.

3.4.2 Alternative 3 – Dredging and Upland Disposal

Short-term, localized increases in turbidity are likely to occur during dredging activities. Turbidity would reduce the penetration of light in the water column. A small number of plants would be directly removed by the dredging action. However, the effects are anticipated to be discountable for several reasons:

- dredging will occur during the fall and winter when light penetration will already be low and plant growth is minimal;
- existing aquatic vegetation in the project area is very sparse and the numbers and extent of native vegetation will not be substantially impacted;
- fallback of sediment during dredging will largely occur within the channel, where vegetation has already been removed;
- conditions post dredging would be fundamentally the same as current conditions, allowing for a similar development of vegetation.

Impacts of this alternative do not rise to the level of significance.

3.5 Fish

Lake Washington supports a variety of freshwater and migrating anadromous fish, although the populations and species composition has been significantly altered from historic conditions. Salmon and trout populations have declined with three populations listed as threatened or endangered, including coastal/Puget Sound bull trout (*Salvelinus confluentus*), Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*), and Puget Sound steelhead (*Oncorhynchus mykiss*)

Piscivorous fish in Lake Washington include cutthroat trout (*Oncorhynchus clarkii*), northern pikeminnow (*Ptychocheilus oregonensis*), smallmouth bass (*Micropterus dolomieu*), and yellow perch (*Perca flavescens*). Pelagic forage fishes include longfin smelt (*Spirinchus thaleichthys*), threespine stickleback (*Gasterosteus aculeatus*), and juvenile sockeye salmon (*O. nerka*), which reside 1.5 years in the lake before migrating to the ocean. There are at least 20 non-native fish including centrarchid, cyprinidae, and ictalurid species that have been introduced into Lake Washington (U.S. Geological Survey, USGS 2020). Many of the non-native piscivorous fish (e.g. smallmouth and largemouth bass) are more tolerant of warmer water than native species. As water temperatures increase due to climate change, non-native species may gain a competitive edge over rearing salmonids.

Sockeye salmon are the most numerous naturally reproducing salmonid in the Lake Washington basin and, in years of high abundance, the population has supported a

significant Tribal treaty harvest and one of the largest sport fisheries in the state. The 2019 returns to the basin, 17,411 fish, was the lowest count in the past 50 years (Locks fish counts, WDFW unpublished). Out-migration of juvenile coho salmon from the Bear Creek tributary is typically about 30,000 individuals. Total production for the 2017 migration year was the lowest in the history of the WDFW assessments at the site, at 6,004 individuals (WDFW 2018). There is one Chinook salmon hatchery in the watershed at Issaquah Creek. They release approximately 2 million Chinook salmon smolts each year (Berge et al. 2006). Sammamish Chinook, formerly called North Lake Washington Tribs Chinook, were identified as a stock based on their distinct spawning distribution. Sammamish Chinook primarily spawn in Issaquah Creek, Bear Creek, and Cottage Lake Creek. Additional areas that support Chinook spawning include larger tributaries to the Sammamish River (North, Swamp, and Little Bear Creeks) and larger tributaries to Lake Washington (Kelsey, Coal, May, Thornton, and McAleer Creeks). Escapement of Sammamish Basin Chinook has ranged between 482 and 2,223 total adults over the past 15 years (WDFW 2019a) (Figure 3-6). Natural origin spawners on average represented 12% of total escapement counts.

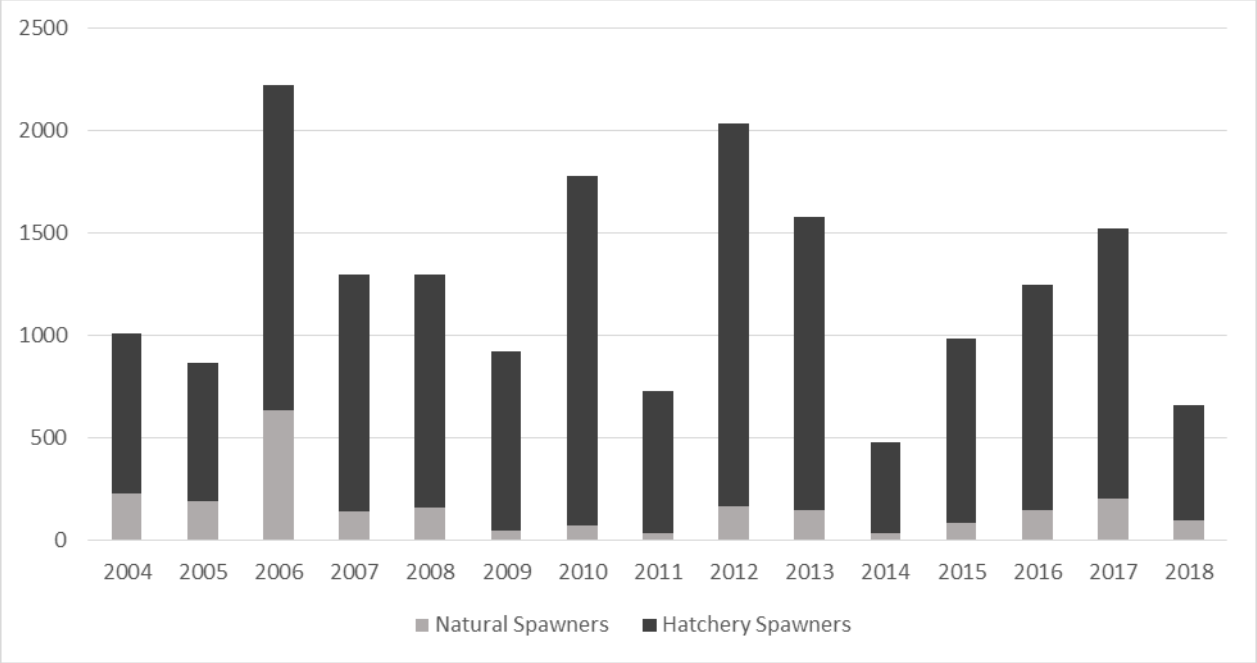

Figure 3-6. Chinook escapement within the Sammamish Basin.

Steelhead in North Lake Washington/ Sammamish tributaries and in the Cedar River are demographically independent populations (DIP) within the ESA-listed Puget Sound steelhead Distinct Population Segment (DPS) (NMFS 2018). The recent Proposed Recovery Plan for the Puget Sound Steelhead DPS (NMFS 2018), states that the North Lake Washington DIP is “nearly extirpated” citing impacts from sea lion predation at the Ballard (Hiram M. Chittenden) Locks. The current abundance estimate for the North Lake

Washington is 0 fish (Figure 3-6) with recovery goals set at 4,800-16,000 in North Lake Washington (NMFS 2018).

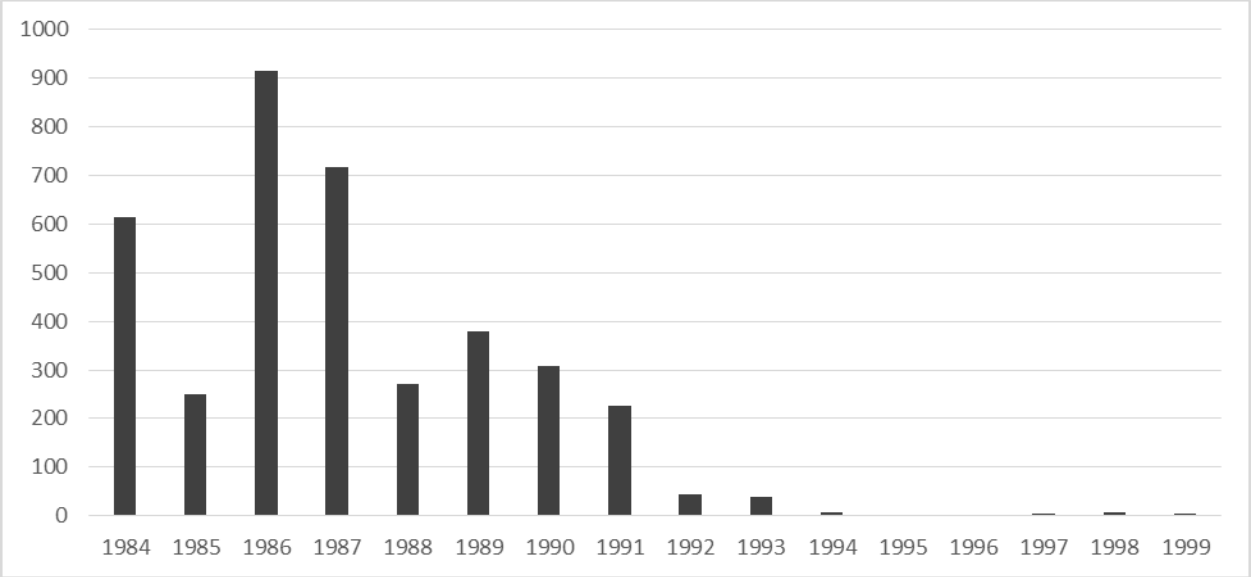

Figure 3-7. North Lake Washington and Lake Sammamish steelhead escapement

Local recreational fishing reports indicate people often pursue non-native warm water species such as large and small mouth bass and carp. Native that were most often encountered were the northern pike minnow (*Ptychocheilus oregonensis*) and less commonly cutthroat trout (*O. clarkii*).

3.5.1 Alternative 1 – No-Action

The No-Action Alternative would have no negative effects to fish species.

3.5.2 Alternative 3 – Dredging and Upland Disposal

The potential impacts of the preferred action include entrainment, resulting in direct mortality; physiological and behavioral effects of increases in turbidity and underwater noise; and a reduction in prey items (benthic macroinvertebrates).

Entrainment

There is little evidence of mechanical dredge (i.e., clamshell) entrainment, bucket strike, or direct collision of mobile organisms such as fish (NMFS 2018). The small size of the bucket compared against the distribution of the organisms across the available habitat make this situation very unlikely, and that likelihood decreases after the first few bucket cycles because mobile organisms are most likely to move away from the disturbance. Further, mechanical dredges move very slowly during dredging operations, with the barge typically staying in one location for many minutes to several hours, while the bucket is repeatedly lowered and raised within an area limited to the range of the crane arm. Mobile organisms such as fish, in the vicinity of the clamshell dredge at the start of the operation would likely swim away to avoid the noise and activity (NMFS 2018). The use of in-water

work windows further reduces the chances of entrainment. The risk of clamshell bucket strike or entrainment by clamshell dredge is discountable due to the ability of mobile organisms to move away from the threat.

A few individuals of smaller species, such as sculpin or three-spine sticklebacks, may be entrained by the dredge bucket during the first bucket cycles. However, these species are populous, and the loss of few individuals will have no effect on populations. The large majority of fish are likely to avoid the area due to the disturbance caused by turbidity and noise.

Underwater Noise

Fishes' sensitivity to hearing varies, but most exhibit a response to sounds in the range of 50 Hz to 2 kHz, with a minimum threshold around 70 dB (Hastings and Popper 2005). Noise frequencies from clamshell and hydraulic dredging fall within this range (Dickerson et al. 2001). The impacts vary by species, their behavior, and habitat. Noise generated by clamshell dredges is characterized as continuous (or non-pulsed), since the elevated sound pressure occurs over seconds (not milliseconds, as is the case with pulsed noise). Injuries to fish are generally limited to high intensity pulsed sounds (e.g. explosions, pile-driving, airguns) (McQueen et al. 2018). The following are noise thresholds for various forms of effects on salmonids for pile driving (which apply to both impact and vibratory) (Fisheries Hydroacoustic Working Group 2008). Note that vibratory pile driving is also considered continuous:

- 150 dBRMS for harassment for continuous noise for fish of all sizes
- 187dB cumulative SEL for injury of fish ≥ 2 grams
- 183dB cumulative SEL for injury of fish < 2 grams
- 206 dBpeak for injury of fish of all sizes

The following are noise thresholds based on Popper et al. (2014):
Continuous sound (vibratory pile driving):

- For fish with swim bladders that are involved in hearing (e.g. minnows)
    - 170 dBRMS for 48 hours for recoverable injury
    - 158 dBRMS for 12 hours for TTS (Temporary Threshold Shift, or complete recovery of hearing loss)
- There is no direct evidence for mortality or potential mortal injury for continuous noise.
- There are no continuous noise thresholds set for fish without swim bladders or those with bladders that are not involved in hearing (salmonids).

Data for how continuous sound affects fish are limited and in the technical report of sound exposure guidelines prepared by Popper et al. (2014), they rank the level of risk of injury as high, moderate, or low for most categories of fish instead of presenting number thresholds for harm. According to Popper, the risk of mortality for continuous sound such

as clamshell and hydraulic dredging is low for all categories of fish at all distances from the sources of sound. The risk of recoverable injury is similar except for fish with a swim bladder used for hearing, which does not apply to salmonids, bass, or carp.

The area affected by dredging associated noise varies according to water depth, substrate type, water surface condition, salinity, and total suspended solids (Suedel et al. 2019). Absent site-specific data the National Marine Fisheries Service (NMFS 2018) has recommended the use of the following generalized equation to approximate the received level of noise from a source at a given range:

$$RL = SL - \#Log(R) - \alpha$$

Where:

RL = Received level (dB)
SL = Source level (dB)
# = Spreading loss coefficient
R = Range (meters)
α = Absorption coefficient (dB(R/km))

The spreading loss coefficient is estimated at 20 for spherical spreading, 10 for conical spreading, and in nearshore environments acoustic measurements indicate a value close to 15. For this analysis we will assume spherical spreading. The absorption coefficient varies in relation to the frequency of the source noise. For frequencies below 10,000 Hz the coefficient approaches 0 and can be appropriately disregarded. Dickerson et al. (2001) reported noise from clamshell dredging in the frequency range of 20 to 1000 Hz and a peak output of 169 dB (calculated using equation above for source level when RL = 124 dB at a range of 154m). Because the frequency range is well below 10,000 Hz, the absorption coefficient may be disregarded in this application. Additionally, the peak output of 169 dB was produced by the impact of the clamshell dredge in contact with a hard substrate composed of coarse sand and gravel, and project sediments are mainly silt. Noise from bucket strikes are likely to be much less than this scenario. Given that the lowest sound threshold of concern is 150 dB, the equation can be solved for the range defining the zone of potential impacts:

$$150\ dB = 169\ dB - 20Log(R)$$

$$R = 8.9\ meters\ or\ 29.2\ feet$$

There is potential for behavioral responses of all fish via harassment since there is potential for the sound levels to exceed the minimum hearing threshold of 70 dB, but these impacts would be temporary. Because of the avoidance of the dredge, and the low likelihood that noise injury thresholds would be exceeded, this alternative would not have significant effects to fish communities. Furthermore, the impacts of noise on fish would

be insignificant since there are high levels of ambient noise from vessel and seaplane traffic.

Turbidity

The temporary increases in suspended solids could affect fish in the immediate dredging area through decreased visibility for foraging/ predation avoidance and impaired oxygen exchange due to clogged or lacerated gills. The available evidence indicates that total suspended solids (TSS) levels sufficient to cause physiological effects would be limited in extent. LeGore and Des Voigne (1973) conducted 96-hour bioassays on juvenile coho salmon using re-suspended Duwamish River sediments from five locations. Up to 5% sediment in suspension (28,800 mg/l dry weight), well above levels expected to be suspended during dredging, had no acute effects. Salo et al. (1979) reported a maximum of only 94 mg/l of sediment in solution in the immediate vicinity of a working dredge in Hood Canal. This indicates that turbidity effects are likely to be limited to the behavior of fish.

The most common behavior impact will be avoidance of the affected area, but a few individuals may be directly affected by increased turbidity. Affected fish may have reduced feeding rates while within the area of increased of turbidity; however, the impact would be temporary and only very near to the dredging action. Some could be more prone to predation to fish better adapted to turbid conditions. Behavioral effects would have a negligible effect on all populations of fish and the effects would only last as long as the dredging.

Because of the avoidance of the dredge, and only temporary and minor impacts from turbidity, this alternative would not have significant effects to fish communities.

3.6 Wildlife

The highly developed Sammamish River and Lake Washington do not support significant populations of wildlife due to the prevalent human activity, noise, and a lack of habitat and food. Mammal species present may include the river otter (*Lontra canadensis*) and raccoons and rodents along the shoreline. Bird observations tend to be those most habituated to human activity and waterfowl that can maintain a distance from humans. 108 species of birds have been observed at St. Edwards State Park, about one mile south of the project site. The top five reported sightings include: American crow (*Corvus brachyrhynchus*), common merganser (*Mergus merganser*), pine siskin (*Pinus spinus*), American robin (*Turdis migratorius*), and European starling (*Sturnis vulgaris*) (ebird 2020). However, the park contains a large amount of upland habitat, while none exists in proximity to the project. The project area may support occasional, seasonal migrants, but is likely used primarily by birds well habituated to humans (e.g. gulls, crows, and pigeons).

3.6.1 Alternative 1 – No-Action

The No-Action Alternative would have no effect on mammals or birds.

3.6.2 Alternative 3 – Dredging and Upland Disposal

Maintenance dredging of the Kenmore navigation channel would have a low level of disturbance to wildlife due to noise and presence of humans on the dredge vessel. This may temporarily displace a small number of birds and mammals. Due to the regular traffic around the Kenmore navigation channel by commercial and recreational vessels and seaplanes, maintenance dredging is not expected to cause more than the usual amount of disturbance to birds or mammals; however, the constant noise from the operating dredge (clamshell or hopper) may cause mammals and birds to avoid the immediate area around the dredge during dredging and prefer areas with only ambient noise. Lights operating on the dredge would temporarily increase ambient lighting levels at night in the immediate vicinity of the dredge, but are not expected to adversely affect adjacent habitats beyond the immediate vicinity of the dredge operation. In-air noise levels are expected to be minimal, limited in space and time, and somewhat masked by ambient noise in the project area due to considerable human activity.

Maintenance dredging would have no lasting impacts to the native populations or habitat. Some birds, potentially migratory birds less habituated to human activity, may be temporarily displaced. This will not substantially impact the individuals as it is a small area of a large lake that will be affected, and the existing surrounding habitat is not conducive to supporting wildlife. Migratory species and those sensitive to human activity are more likely to inhabit areas like St Edwards State Park to the south. This action would not have significant impacts on wildlife.

3.7 Benthic Invertebrates

No data was identified for benthic invertebrates in the vicinity of the project. Given the conditions at the site (sandy silt, slow water-flow, and disturbance from vessel traffic), the organisms most likely to thrive include chironomids (fly midges), oligochaetes (roundworms), and the non-native corbicula clam (*Corbicula fluminea*) that is present throughout Lakes Washington and Sammamish (USGS 2020). These organism classes/ species are known to be highly productive in regularly disturbed areas. They typically are some of the first organisms to recolonize disturbed areas and can quickly develop substantial populations. Chironomids develop from eggs to pupae (the preferred food of juvenile salmon) in a matter of 7 – 14 days. Their entire life cycle may be less the six weeks.

3.7.1 Alternative 1 – No-Action

The No-Action Alternative would have no negative effects to benthic invertebrates. The navigation channel and surrounding area appears to experience regular disturbances as it is the only area of that portion of Lake Washington nearly void of aquatic vegetation. USACE is aware of accounts of deeper draft vessels causing direct disturbance with propellers contacting the sediment. These occurrences very likely have resulted in the current condition of low vegetative cover and would limit the benthic community to those

species able to compensate for the regular disturbances. No maintenance dredging would allow for the continued regular disturbance and probable reduced species diversity as well as overall population sizes of benthic invertebrates within the navigation channel.

3.7.2 Alternative 3 – Dredging and Upland Disposal

Maintaining the channel would remove benthic organisms from the portion of the channel that is dredged. The material to be dredged mainly occurs in the middle portion of the navigation channel nearest to the mouth of the Sammamish River (Figure 2-1). The dredging area is small relative to the total benthic area covered by the invertebrate populations; the loss of a relatively small number of benthic organisms to dredging compared to total habitat available in the project area would not impact the total population. Furthermore, the elimination of propeller disturbances to the sediment may allow for the development of a more diverse community of benthic species as well a greater number of individuals. Shallow water and fine-grained sediment as benthic habitat, such as in the project area, is associated with r-selected benthic assemblages (Wilber & Clarke 2007). R-selected benthic organisms are those that reproduce frequently and in typically in larger number than k-selected species. Organisms such as chironomids and oligochaetes would rapidly recolonize the area, resulting in a temporary loss of a relatively small number of native benthic invertebrates. The action would not have a significant impact to benthic invertebrates.

3.8 Threatened and Endangered Species

North Lake Washington potentially hosts 6 species that are federally listed under the Endangered Species Act; these appear in Table 3-2 with their critical habitat status. There are historic data for the occurrence of fish species in the area, while the birds on the list are not documented in the area and habitat conditions are probably not suitable to sustain the listed bird species.

Table 3-2. Species listed under the Endangered Species Act with status and critical habitat designation.

Common Name	**Scientific Name**	**Designated Critical Habitat**
Coastal/Puget Sound bull trout	*Salvelinus confluentus*	Yes
Puget Sound Chinook salmon	*Oncorhynchus tshawytscha*	Yes
Puget Sound steelhead salmon	*Oncorhynchus mykiss*	No*
Yellow-billed cuckoo	*Coccyzus americanus*	No
Marbled murrelet	*Brachyramphus marmoratus*	No
Streaked horned lark	*Eremophila alpestris strigata*	No

* Critical habitat is designated for this species, but the project area is excluded from designation.

The Kenmore Navigation Channel is located within Water Resource Inventory Area (WRIA) 8, which has two ESA-listed threatened populations of Chinook salmon: the Cedar population (Cedar River and tributaries) and the Sammamish population (Sammamish River, North Lake Washington tributaries, Little Bear Creek, Bear/Cottage Lake Creek, Issaquah Creek, Kelsey Creek) (WRIA 8 Steering Committee 2017). The nearshore of Lake Washington is designated as critical habitat for Puget Sound Chinook salmon. Hatchery populations included in the listing that are present with the Lake Washington watershed are the Issaquah Creek Chinook stock (70 FR 37174). The presence of Chinook in the system is well documented and studied. Adults migrate from Salmon Bay to tributaries of the Sammamish River June through September and spawn through November (WRIA 8 Steering Committee 2017). The Sammamish River population primarily uses the Bear Creek tributary for spawning and occasionally Little Bear Creek. The main stem of the Sammamish River is not used for spawning due to the lack of appropriate habitat in the low-grade and heavily silted channel (Puget Sound Indian Tribes and WDFW 2017). Juvenile Chinook move to Lake Washington as fry or fingerlings from February to June then pass through the Locks from May to September with peak smolt outmigration occurring in June (PSP 2005).

Lake Washington is documented rearing habitat for bull trout and according to WDFW (WDFW 2019b) and is designated as critical habitat. The only Lake Washington population of bull trout is in the upper Cedar River above an impassable barrier. Bull trout that are observed in the lower Cedar River are adult or possibly sub-adult fish that have likely been entrained through the powerhouse at the base of the upper Cedar River barrier. These fish cannot return to the upper watershed to spawn. Bull trout found in other areas of the watershed could have originated from the Cedar or from other river basins outside the Lake Washington watershed such as the Snohomish River. Bull trout are infrequently found in other areas outside the Cedar River including Lake Washington and Sammamish River. These areas are critical habitat and identified as foraging, overwintering, and migration habitat for bull trout. Over 20 years, a small number of adult and sub-adult bull trout have been observed in Lake Washington and the Hiram H. Chittenden Locks in the Lake Washington Ship Canal. Bull trout have been reported below the Locks in marine waters and one or more have been observed passing through the fish ladder at the Locks from late spring through early summer (May through July). Excessive summer water temperatures (July through September) probably limit bull trout use of the Sammamish River and nearshore areas of Lake Washington.

Puget Sound steelhead trout are listed as threatened under the ESA (72 FR 26722). Anadromous steelhead can spend up to 7 years in freshwater prior to moving into marine waters. They can spend up to 3 years in salt water before migrating back to natal streams to spawn. Unlike Pacific salmon, steelhead may spawn more than once during their

lifetime. Steelhead can be split into two separate runs for spawning: summer and winter. Only a winter run is recognized for the Lake Washington/ Sammamish Tributaries DIP. As described in section 3.5 and represented in Figure 3-7, this DIP is nearly extirpated and highly unlikely to occur in the project area.

3.8.1 Alternative 1 – No-Action

This alternative would have no effect on ESA-listed species or their designated critical habitat because dredging would not occur.

3.8.2 Alternative 3 – Dredging and Upland Disposal

This alternative represents the recurring maintenance dredging program at the Kenmore Navigation Channel as occurs approximately every 15 years. The effects of maintenance dredging will be intermittent and limited in physical effect and duration and will result largely in maintaining existing conditions. Potential effects of maintenance dredging with a clamshell dredges include entrainment, elevated underwater noise, increased turbidity, and altered benthic habitat. Entrainment, noise, and turbidity and their potential to effect fish are discussed in detail in section 3.5.

The effects to benthic invertebrates as described in section 3.7 have the potential to have a minor effect on the ESA listed fish. Out-migrating juvenile salmonids from the Sammamish River primarily feed on benthic organisms such as chironomids. The reduction in benthic organisms would have a minor and temporary effect on the foraging opportunities for juvenile salmon, but no effect to larger sub-adult and adult fish as they feed primarily on organisms in the water column. The juveniles that may have reduced foraging opportunity would be the earliest emerging fish, which are often less fit individuals that naturally experience low survival rates. These fish are often pushed downstream by late-winter storm stream flows, resulting in very low survival rates (Quinn 2018). USACE anticipates that the effect to juvenile salmonids by a small and temporary reduction of benthic organisms would be less than measurable.

It is highly unlikely that impacts of this alternative would rise to the level of significance. USACE anticipates that the application of Reasonable and Prudent Measures, as provided by the Services, would ensure impacts to listed species are non-significant. Endangered Species Act consultation and coordination letters are provided in Appendix C.

3.9 Cultural Resources

The USACE has coordinated its review of cultural resources impacts under Section 106 of the National Historic Preservation Act (NHPA). The USACE has determined the area of potential effect (APE) for both direct and indirect effects to encompass the Federal navigation channel, portions of Lake Washington, and the adjacent shoreline to include a total area of approximately 340 acres. Ground disturbance from dredging would take

place only within the established navigation channel, an area 100 to 120 feet wide, approximately 2,900 feet long for a total area of approximately 11 acres.

A USACE staff archaeologist conducted a records search and literature review for the APE, including a records search of the archaeological and historic site records at the Washington State Department of Archaeology and Historic Preservation (DAHP) online database and a review of archival records available at the USACE, Seattle District. The literature review revealed that there are no historic properties located within the project APE.

3.9.1 Alternative 1 – No-Action

The No-Action Alternative would have no effect to cultural resources.

3.9.2 Alternative 3 – Dredging and Upland Disposal

Alternative 3 would have no effect on cultural resources. There are no cultural resources located within the APE and the USACE anticipates a finding of No Historic Properties Affected.

3.10 Indian Treaty Rights

In addition to the Federal government's responsibilities under NHPA, the Federal government must consider the effects its actions may have on American Indian treaty rights. The Federal basis of a tribe's legal status rests within the context of U.S. Constitutional provisions for Federal government's powers for treaty making with other sovereign nations, and American Indian tribes' inherent sovereignty. One of the treaty-reserved rights for certain Tribes is the ability to conduct fishing activities at all Usual and Accustomed locations. Tribal fisheries are central to the cultural and economic existence of the Tribes and their members.

Native American tribes that may be affected by the proposed action include the Yakama Nation, the Muckleshoot, Snoqualmie, Suquamish, and Tulalip Indian Tribes. The Muckleshoot and Suquamish Tribes are co-managers alongside Washington Department of Fish and Wildlife (WDFW) of the Lake Washington Chinook fishery. Fisheries occur annually depending on the number of returning adults. Small returns may result in only ceremonial and subsistence salmon fishing within the Lake Washington system (includes Lakes Washington, Sammamish, and Union and the Ship Canal) (WDFW 2020).

3.10.1 Alternative 1 – No-Action

The No-Action Alternative would have no impact on fisheries or Indian treaty rights.

3.10.2 Alternative 3 – Dredging and Upland Disposal

Maintenance dredging would result in no significant impact to fish populations as described in Section 3.5. In order to avoid any potential impact with Tribal fisheries, timing of dredging will be coordinated with all Tribes potentially affected. Previous maintenance dredging was performed from December to February in consultation with the Muckleshoot

Indian Tribe. The in-water work is tentatively scheduled for 16 November 2020 to 1 February 2021 and is not expected to overlap with Tribal salmon fishing.

This action would be performed after consulting with potentially affected Tribes and scheduled in order to not have any significant effect on Indian treaty rights.

3.11 Air Quality and Greenhouse Gas Emissions

In accordance with the Clean Air Act (CAA), the EPA set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to the environment and public health. The six principal pollutants, also known as "criteria" pollutants, are ozone, lead, particulate matter, carbon monoxide, nitrogen dioxide, and sulfur dioxide. The proposed project is located in King County, which is not a non-attainment or maintenance area for all six principal pollutants, meaning that all NAAQS are met. The Puget Sound Clean Air Agency monitors air quality in Snohomish, King, Pierce, and Kitsap Counties. Air quality is generally good in western Washington and King County. According to the Puget Sound Clean Air Agency, there are two criteria pollutants of concern in the area, particulate matter and ozone. In 2014, a portion of Pierce County did not meet standards for particulate matter and was deemed a non-attainment area. The project area is in an attainment zone for all air quality parameters meaning that it meets NAAQS.

Anthropogenic sources of greenhouse gases (primarily carbon dioxide, methane, and water vapor) have been increasing over the past 150 years and have reached a rate of contribution that is causing climate change. In 2013, the largest contributor of greenhouse gases in Washington was the transportation sector when fuel is used in cars, trucks, ships, trains, and planes (44.6%; Ecology 2020b). Significant point sources of greenhouse in the vicinity were the University of Washington, Northwest Pipeline GC, Puget Sound Energy, and Enwave Seattle, which combined released a total of 284,603 metric tons of CO_2e in 2018 (EPA 2018). CO2e includes all greenhouse gases in terms of an amount of CO2 that would have an equivalent effect.

3.11.1 Alternative 1 – No-Action

The No-Action Alternative would have no effect on regional or local air quality and would have no output of greenhouse gases.

3.11.2 Alternative 3 – Dredging and Upland Disposal

The dredge and the tugs necessary to move the dredge and barges are fossil fuel powered and thus contribute to air pollution. The EPA established threshold levels of pollutants of concern for nonattainment or maintenance areas; however, the Kenmore navigation channel is not located in a nonattainment or maintenance area because air quality in King County does not have air quality worse than the NAAQS (EPA 2020a). Furthermore, the EPA sets threshold levels for the requirement of a conformity determination for key NAAQS pollutants in a nonattainment or maintenance area, but in addition to the proposed action not being located in a nonattainment or maintenance area,

the thresholds do not apply to “maintenance dredging and debris disposal where no new depths are required, applicable permits are secured, and disposal will be at an approved disposal site” which would result in an increase in emissions that is clearly *de minimis* (40 CFR 93.153(c)(2)).

Air Emissions Calculation Methodology

To calculate anticipated emissions for a project, projected equipment hours were multiplied by composite emission factors for each class of equipment. Emission factors provide a way to convert equipment hours to pounds of pollutants. Emissions were estimated using the 2016 Puget Sound Maritime Emissions Inventory (Puget Sound Maritime Air Forum 2018) in conjunction with EPA calculation methods (EPA 2009). The emissions factors were then multiplied by the estimated predicted hours or miles for each unit of equipment to produce an estimated emission. A summation of each equipment emissions was then created (in tons). Assumptions and calculations are documented in Appendix C, Emissions Calculations.

Table 3-3. Estimated emissions in metric tons per year for pollutants of concern.

Air Pollutant	**Estimated annual emissions in tons**
Nitrogen Oxide (NO_x)	14.3
Volatile organic compounds (VOCs)	0.5
Carbon Monoxide (CO)	2.3
Particulate Matter (PM10)	0.4
Sulfur Dioxide (SO_2)	0.1
Carbon Dioxide (CO_2)	1,513.1

The proposed action would not occur in a nonattainment or maintenance area. Emissions are not expected to cause adverse health effects or result in violation of applicable air quality standards; therefore, impacts will be inconsequential and result in no more than a *de minimis* increase in criteria pollutant emissions over no-action conditions.

Operation of the dredge and associated support vessels would emit greenhouse gasses from burning fossil fuels. The anticipated maximum of 77 days of work would emit an estimated 1,513 tons of carbon dioxide, in comparison to the 4.92 million metric tons of CO_2 emissions produced in 2017 from the industrial sector in Washington (Ecology 2020b). The minor contribution of the proposed dredging would not constitute a measurable or significant effect among the impacts of climate change and sea level rise.

According to this analysis, the effects of the proposed action to air quality would not be significant.

3.12 Recreational Value

Recreation opportunities near to the project area are primarily boating, paddling, swimming, and fishing. Fishers target small and largemouth bass, carp, northern pike minnow, trout, and salmon. Recreational boating includes canoeing, kayaking, and other small, recreational vessels. Due to the predominant weather conditions of western Washington, the vast majority of outdoor recreation occurs during the months of July-September. Public access points and parks are outside of the industrial area that is serviced by the navigation channel (Figure 3-8).

Figure 3-8. Recreational and public access areas in Kenmore, WA (City of Kenmore 2019).

3.12.1 Alternative 1 – No-Action

The No-Action Alternative would have no effect on recreation until shoaling makes navigation for pleasure craft around Kenmore difficult. This alternative would have no effect to the ability of the public to enjoy the region's waterfront and public beach access.

3.12.2 Alternative 3 – Dredging and Upland Disposal

During dredging, there would be minimal effects to recreation since recreational boaters and fishers would be required to avoid the immediate area of the dredge and disposal

barge for safety reasons, but that area is small compared to the entire surface area of northern Lake Washington. Access would be maintained at all the public lake and river access points, and the dredging would not prevent use of adjacent marinas. Recreational use would be very low during the work window of 16 November to 1 February, and the chance of impacting public recreation is negligible. Lights operating on the dredge would temporarily increase ambient lighting levels at night in the immediate vicinity of the dredge, but are not expected to adversely affect recreation beyond the immediate vicinity of the dredge operation. In-air noise levels are expected to be minimal, limited in space and time, and somewhat masked by ambient noise in the project area due to substantial nearby road traffic.

Impacts to recreation would be negligible and would not extend beyond the period of dredging. Therefore, impacts are considered non-significant.

3.13 Socioeconomic Resources

A purpose of the project is to maintain vessel access to industrial areas to preserve economic conditions and opportunities. The project area is contained in Kenmore, King County, at the northern margin of Lake Washington. According to the U.S. Census Bureau (2020), Kenmore has a population of 23,093, and median household income of $105,007 (Table 3-4). The largest employer in the city is Bastyr University, but many people work outside of Kenmore in the aerospace and technology industries. There are nearly 500 small businesses including many multi-generational companies such as Kenmore Air, Plywood Supply, and Kenmore Camera. The Kenmore navigation channel has been used for many years for shipping of concrete products and materials by CalPortland and was also used for transporting materials and equipment for the recent improvements made to the SR-520 floating bridge.

Table 3-4. Demographic estimates for the City of Kenmore and King County, 2018.

	City of Kenmore	King County
Total Population	23,093	2,233,163
Households	8,699	865,627
Employment Rate	70.0%	69.8%
Median Household Income	$105,007	$89,418
Per Capita Income	$49,360	$49,298

3.13.1 Alternative 1 – No-Action

The No-Action Alternative poses risk to the existing and future opportunities of the region's industrial sector. The load size of barges using the Kenmore industrial park would have to be reduced as shoaling reduces the water depth. Eventually, industrial use may be infeasible, eliminating the current industrial jobs as well as future growth potential in the area.

3.13.2 Alternative 3 – Dredging and Upland Disposal

Maintaining the navigability of the channel would preserve the socioeconomics of the area by maintaining access to the Kenmore industrial park and use of barges to their full capacity. The proposed continued maintenance dredging would not have a significant negative impact on the socioeconomics of the area and may provide for increased future opportunities at the Kenmore industrial park.

3.14 Public Health and Safety

The project area is used for recreation and commercial and industrial transportation. Safe navigation for each user group is important for the safety of all users. A deep-draft vessel becoming stuck due to the shoaling of sediments could pose a safety risk to recreational boaters in the summer or the frequent seaplanes transiting the area.

3.14.1 Alternative 1 – No-Action

The No-Action Alternative would result in continued shoaling within the navigation channel and increased potential for interferences with navigation. The lack of safe navigation routes could pose a risk to the public if a vessel becomes stuck. The need for additional loads of material from the Kenmore Industrial Park, due to light loading, may also increase public safety risks as navigation paths could become increasingly congested.

3.14.2 Alternative 3 – Dredging and Upland Disposal

Removal of shoaled sediments from the navigation channel would allow for safe passage of vessels and continuation of existing uses. Potential public health and safety risks would be reduced following the completion of the maintenance dredging. This alternative would not result in a significant negative effect to public health and safety.

4. Cumulative Effects Analysis

The NEPA defines cumulative effects as the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR §1508.7).

Lake Washington and the Sammamish River are highly modified systems due to industrial and residential development dating back more than 100 years. In 1916, USACE constructed the Lake Washington Ship Canal connecting Lake Washington to the Puget Sound rather than the historic connection via the Black River. This action also lowered the lake level by 9 feet. The lowering of Lake Washington reduced the amount of shallow water habitat and available shoreline. Approximately 1,334 acres of shallow water habitat was exposed, lake surface area was reduced by 7%, and the shoreline was reduced by 12.8% (Chrzastowski 1983). Lake Washington is heavily developed and generally lacks shoreline habitat features such as shade, submerged and overhanging large wood, log

jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks. Of the total remaining shoreline of Lake Washington, 70% has been armored by riprap or bulkhead while the remainder is beach, naturally vegetated, or landscaped (Toft 2001).

Historically, the Sammamish River system was well connected to large wetlands and complex side-channel systems providing refuge for salmon during high flows (Tetra Tech, Inc. 2002). The area has been drained, filled, and had dykes installed over the last 150 years, reducing the system to a single, channelized river disconnected from floodplain or wetland habitat and essentially devoid of riparian habitat.

Initial construction of the Kenmore navigation channel was completed in March 1981. The most recent maintenance dredging of the Kenmore Navigation Channel occurred in January 1998 which removed 49,126 cy of sediment. At that time, two DMMUs failed to meet suitability criteria for open-water disposal and it was decided to leave the material in place. The two DMMUs (S-4 and S-10) have not been dredged since project completion in 1981. The current area to be dredged is the portion of the Federal navigation channel that contain material above project depth and includes the two DMMUs not dredged in 1998.

Construction on a new West Sammamish River Bridge was estimated to begin in 2019; however, the project has been delayed until winter 2020 due to permitting delays caused by the Federal government shutdown early in 2019 (City of Kenmore 2019). The project will replace the existing southbound lanes with a new structure to parallel the northbound lanes. Removal of the current bridge and construction of the new bridge are scheduled to take about two and a half years. The bridge is just within the eastern boundary of the action area.

Treatment of aquatic noxious weeds, as described in Section 3.4, using physical and chemical measures, may have effects on the biological community in the action area. Physical removal of plants may disturb the benthic community and temporarily increase turbidity. Chemicals selected for aquatic and emergent noxious weeds include glyphosate, triclopyr, and diquat. All are approved for aquatic use by EPA and WA Ecology. Application of chemicals will result in a considerable amount of dead plant material on top of sediments. The breakdown of the vegetation may lead to localized decreases in dissolved oxygen near the sediment surface and smothering of sessile benthic invertebrates.

The proposed maintenance dredging and placement would cause a minor, temporary loss of benthic invertebrates, but would maintain authorized depths of the navigation channel. In consideration of past developments leading to the existing conditions within Lake Washington and the Sammamish River, and the limited amount of anticipated future alterations within the area, the proposed routine maintenance of the Kenmore navigation channel is not a significant addition to cumulative impacts in Lake Washington and the

Sammamish River. The USACE concludes that there would be no continuing, additive, and significant relationship to previous effects by the proposed maintenance dredging and upland disposal actions.

5. Mitigation and Monitoring for Adverse Environmental Effects

No compensatory mitigation is proposed for this action as no loss of wetlands, no substantial adverse effects to ESA-listed species, and no significant impacts to commercially important species are anticipated to occur based on the analyses in this document. The Corps will implement several avoidance and minimization measures to ensure impacts are no greater than minimal, short-term effects. These measures are provided in section 2.3.

NMFS provided four Reasonable and Prudent Measures in their Biological Opinion relating to the minimization and monitoring of incidental take. They are:

1. Minimize incidental take of Puget Sound (PS) Chinook salmon from exposure to propeller wash.
2. Minimize incidental take of PS Chinook from exposure to contaminated forage.
3. Minimize incidental take of PS Chinook salmon from exposure to altered benthic habitat.
4. Ensure the implementation of monitoring and reporting to confirm that the take exemption for the proposed action is not exceeded.

These measures will be taken up by USACE through the application of the terms and conditions provided in NMFS' Biological Opinion (Appendix C).

6. Coordination

The USACE has coordinated with Federal and state agencies and tribes regarding maintenance dredging of the Kenmore Navigation Channel. During the development of this EA and supporting documents, the USACE consulted and coordinated with the following entities and agencies:

- Environmental Protection Agency
- National Marine Fisheries Service
- U.S. Fish and Wildlife Service
- Muckleshoot Indian Tribe
- Snoqualmie Indian Tribe
- Suquamish Indian Tribe
- Tulalip Indian Nation
- Yakama Nation
- Washington Department of Ecology
- Washington Department of Natural Resources

7. Environmental Compliance

The USACE has analyzed the environmental effects of the alternatives and the following sections describe how the preferred alternative complies with all pertinent environmental laws and executive orders.

7.1 National Environmental Policy Act

The National Environmental Policy Act (NEPA) (42 U.S.C. §4321 et seq.) commits Federal agencies to considering, documenting, and publicly disclosing the environmental effects of their actions and to solicit public comment on the proposal. As required by NEPA, this EA describes existing environmental conditions in the project area, the proposed action and alternatives, potential environmental effects of the proposed project, and measures to minimize environmental effects. Alternative 3 is the agency preferred alternative.

A draft version of this document was posted to solicit public comment and fulfill USACE's documentation requirements under NEPA. A 30-day public comment period was held from 8 June to 8 July 2020. The Draft EA did not contain clear instructions for appropriate point of contact at USACE. The Draft EA was reposted with clear instructions and a seven-day extension of the comment period, ending 15 July 2020. Comments were received from eight different individuals or organizations, including Kenmore residents, the City of Kenmore, Tribes, and State and Federal agencies. Comments and USACE responses can be found in Appendix G of the EA.

Many commenters requested USACE review the determination to measure turbidity at 300 feet from dredging rather than the State standard of 150 feet. USACE reviewed the action and determined 150 feet would be possible for this project at this time and place. Large equipment will be placed such that risk of serious injury to personnel is sufficiently reduced. Others requested more information from the DMMO sediment suitability determination that was performed in 2019, and why other data were not considered. The determination has been included in Appendix A. This report provides the most applicable and complete data set as it relevant both spatially and temporally and provides thorough, multi-agency reviewed analysis.

7.2 Endangered Species Act

The Endangered Species Act (16 U.S.C. §1531-1544), Section 7(a) requires that Federal agencies consult with NMFS and U.S. Fish and Wildlife Service (USFWS), as appropriate, to ensure that proposed actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their critical habitats.

The USACE determined that the proposed maintenance dredging and dredged material placement at nearshore and upland sites may affect, but is not likely to adversely affect, any ESA-listed species or designated critical habitat and prepared documentation of this determination (USACE 2019). The USFWS agreed with this determination and the

USACE received a letter of concurrence 12 March 2020, with respect to Puget Sound bull trout and their critical habitat (Appendix C). A biological opinion was received from NMFS 25 June 2020. NMFS concluded that Puget Sound Chinook salmon and their critical habitat are likely to be adversely affected by the proposed action, but that the action would not cause jeopardy to these species. An incidental take statement was included with the biological opinion from NMFS (Appendix C).

NMFS required the USACE to implement Reasonable and Prudent Measures in the biological opinion by following terms and conditions to minimize the level of "take" associated with the proposed action for these species. The USACE incorporated the measures into the Mitigation and Monitoring section of the final EA for maintenance dredging and upland disposal. The USACE will comply with the reasonable and prudent measures of the biological opinions to avoid and minimize adverse impacts to ESA-listed species.

7.3 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §1801 et. seq.) requires Federal agencies to consult with NMFS on activities that may adversely affect Essential Fish Habitat (EFH). The objective of an EFH assessment is to determine whether the proposed action(s) "may adversely affect" designated EFH for relevant commercial, federally managed fisheries species within the proposed action area. The assessment must describe conservation measures proposed to avoid, minimize, or otherwise offset potential adverse effects to designated EFH resulting from the proposed action.

The USACE determined that maintenance dredging of the Federal navigation channel may adversely affect EFH, because removal of dredged material would constitute a detectable effect to EFH (USACE 2019). The effect is the removal of the dredged material and associated benthos; however, as described in Sections 3.3 and 3.7, the impact to sediment quality and benthic invertebrates does not rise to the level of significant. NMFS provided conservation recommendations for the protection of EFH due to the assessment of detectable adverse effects. USACE will implement one of the two recommendations and has proposed methods for minimizing effects in lieu of the rejected recommendation (Appendix C).

7.4 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (16 USC 661 et seq.) requires that wildlife conservation receive equal consideration and be coordinated with other features of water resource development projects. USFWS coordination is not required for maintenance work such as the proposed project.

7.5 Clean Water Act

The Federal Clean Water Act requires Federal agencies to protect waters of the United States. USACE evaluated Section 404(b)(1) and the potential application to this project. This section authorizes the Secretary to issue permits "for the discharge of dredged or fill material into the navigable waters at specified disposal sites". The proposed action will have no explicit discharge of dredged material into navigable waters as all material will be taken for upland disposal. Mechanical dredging with a clamshell dredge would not result in a discharge under 404(b)(1) regulation.

The proposed project, representing the Federal standard and in accordance with 33 CFR 337.2, is environmentally responsible and consistent with state water quality standards, with consideration of the BMPs included for the action (Section 5).

7.6 Coastal Zone Management Act

The Coastal Zone Management Act of 1972 as amended (16 U.S.C. §1451-1464) requires Federal agencies to conduct activities in a manner that is consistent to the maximum extent practicable with the enforceable policies of the approved State Coastal Zone Management Program. The USACE is substantively consistent with the enforceable polices of the Kenmore Shoreline Master Program and provided documentation of this through a consistency determination submitted to Ecology (Appendix E). Conditional concurrence was provided by Ecology 28 August 2020 and Ecology's letter is provided in Appendix E.

7.7 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (16 USC 470) requires Federal agencies to take into account the effects of proposed federal undertakings on historic properties included or eligible for the National Register of Historic Places. The implementing regulations for Section 106 (36 C.F.R. § 800) requires Federal agencies to consult with various parties, including the Advisory Council on Historic Preservation, the State Historic Preservation Office (SHPO), and Indian tribes, to identify and evaluate historic properties, and to assess and resolve effects to historic properties.

The USACE has consulted with the Washington SHPO and affected Tribes for this project. Based on the results of literature and records review, the absence of known or recorded cultural resources within the area of potential effect (APE), and consultation with the SHPO and the Tribe, the USACE determined that there are no historic properties located within the APE and found there would be no historic properties affected by the continued maintenance dredging of the Kenmore navigation channel. On 21 January 2020 the Corps sent letters to the Muckleshoot, Snoqualmie, Suquamish, and Tulalip Indian Tribes soliciting Tribal knowledge and concerns with any historic properties of cultural or religious significance that would be affected by the project. An additional letter was sent to the Yakama Nation on 21 May 2020. Notified tribes were given the opportunity to review and comment within 30 days. No responses or comments were

received about the proposed project. A letter to document the APE was sent to SHPO on January 17, 2020. The SHPO agreed with the USACE determination of the APE on January 21, 2020. A final letter stating the USACE determination that no historic properties would be affected was sent to SHPO, and concurrence with the determination was received 13 August 2020 (Appendix F).

7.8 Clean Air Act

The CAA as amended (42 U.S.C. §7401, et seq.) prohibits Federal agencies from approving or conducting any action that does not conform to an approved state, tribal, or Federal implementation plan. Under the CAA General Conformity Rule (Section 176(c)(4)), Federal agencies are prohibited from approving any action that causes or contributes to a violation of an NAAQS in a nonattainment area. According to 40 CFR Section 93.153 (c)(2)(ix), the requirement for a conformity determination is waived where the proposal will result in a clearly *de miminis* increase in emissions, as long as the project involves maintenance dredging and disposal operations in which no new depths are required and approved disposal sites are used. The proposed action is maintenance dredging and placement at an upland site with no new widths or depths, in an attainment area where no more than *de minimis* increase in emissions would be generated, and is therefore exempt from the requirement for a General Conformity Determination.

7.9 Native American Tribal Treaty Rights

In the mid-1850s, the United States entered into treaties with many Native American tribes in the Northwest. These treaties guaranteed the signatory tribes the right to "take fish at usual and accustomed grounds and stations . . . in common with all citizens of the territory" [*U.S. v. Washington*, 384 F. Supp. 312 at 332 (WDWA 1974)]. In *U.S. v. Washington*, 384 F. Supp. 312 at 343 - 344, the court resolved that the Treaty tribes have the right to take up to 50 percent of the harvestable anadromous fish runs passing through those grounds, as needed to provide them with a moderate standard of living (Fair Share). Over the years, the courts have held that this right comprehends certain subsidiary rights, such as access to their "usual and accustomed" fishing grounds. More than *de minimis* effects to access to usual and accustomed fishing area may violate this treaty right [*Northwest Sea Farms v. Wynn*, F. Supp. 931 F. Supp. 1515 at 1522 (WDWA 1996)]. In *U.S. v. Washington*, 759 F.2d 1353 (9th Cir 1985) the court indicated that the obligation to prevent degradation of the fish habitat would be determined on a case-by-case basis.

Several tribes may have fishing rights in the area and are listed in section 3.10. USACE has consulted and will continue to consult with tribal leaders and natural resource directors regarding avoiding impacts to tribal fisheries resources.

The USACE has concluded the following:

(1) The work timing would be coordinated to protect access to usual and accustomed fishing and gathering areas;

(2) The work would not cause the degradation of fish runs in usual and accustomed fishing grounds or with fishing activities and habitat; and

(3) The work will not impair the Treaty tribes' ability to meet moderate living needs.

7.10 Migratory Bird Treaty Act and Executive Order 13186 Migratory Bird Habitat Protection

The Migratory Bird Treaty Act (16 U.S.C. §703-712) as amended protects over 800 bird species and their habitat, and commits that the U.S. will take measures to protect identified ecosystems of special importance to migratory birds against pollution, detrimental alterations, and other environmental degradations. Executive Order (EO) 13186 directs Federal agencies to evaluate the effects of their actions on migratory birds, with emphasis on species of concern, and inform the USFWS of potential negative effects to migratory birds.

Implementation of the preferred alternative would not have any direct and deliberate negative effects to migratory birds. There would be no adverse effect on habitat and the project would only have minor and temporary effects to a small number of individual birds that may be present in the project area. No permit application for “take” of migratory birds is thus required. These birds are assumed to be habituated to the noise and activity near the city of Kenmore.

7.11 Executive Order 13175 Consultation and Coordination with Indian Tribal Governments

EO 13175 (6 November 2000) reaffirmed the Federal government’s commitment to a government-to-government relationship with Indian tribes, and directed Federal agencies to establish procedures to consult and collaborate with tribal governments when new agency regulations would have tribal implications. The USACE has a government-to-government consultation policy to facilitate the interchange between decision makers to obtain mutually acceptable decisions. In accordance with this EO, the USACE has engaged in regular and meaningful consultation and collaboration with the federally recognized tribes surrounding the project area, the Muckleshoot, Snoqualmie, Suquamish, and Tulalip Indian Tribes, and the Yakama Nation. Letters were sent to the federally recognized tribes to solicit their input prior to releasing the draft EA for public review. No responses were received.

The Muckleshoot Indian Tribe provided comments and questions for the draft EA and USACE responded to each (Appendix F). The Suquamish Tribe raised concerns about vessel traffic interfering with fishing in Puget Sound. USACE will continue to coordinate with the Suquamish Tribe as the transfer barge route is finalized (Appendix F).

7.12 Executive Order 12898, Environmental Justice

EO 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" provides that each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. Environmental justice concerns may arise from impacts on the natural and physical environment, such as human health or ecological impacts on minority populations, low-income populations, and Indian tribes or from related social or economic impacts.

The USACE evaluated the nature and location of the proposed construction site and used the EPA EJScreen online map service to determine whether minority populations, low-income populations, or Indian tribes are present in the action area and may be affected (EPA 2020b). The USACE has analyzed the potential effects of the alternatives on communities within a 3-mile radius of the proposed action and found that there would be no disproportionately high and adverse human health impacts to any environmental justice communities.

7.13 Executive Order 11990, Protection of Wetlands

EO 11990 entitled Protection of Wetlands (24 May 1977) requires Federal agencies to take action to avoid adversely impacting wetlands wherever possible, to minimize wetlands destruction and to preserve the values of wetlands, and to prescribe procedures to implement the policies and procedures of this EO. The preferred alternative of dredging with placement of dredged material at an upland disposal sites would have no effect to any tidal wetlands, as dredging would maintain existing conditions and the disposal site would be in a permitted, upland location.

8. Unavoidable Adverse Impacts

The primary unavoidable adverse impact would be disruption of the benthic community in Kenmore navigation channel. Invertebrate communities are likely to recover within the basin due to infrequency of dredging. Another unavoidable adverse impact would be air pollution and greenhouse gas emissions from the dredge and associated machinery. Both air pollution and greenhouse gas emissions would be *de minimis*.

There would be some effects to water quality in the immediate vicinity of the active dredge, particularly turbidity. Any effects to water quality would be short lived and small scale. Therefore, any effects to water quality would be insignificant. Effects to aquatic wildlife would be minimized by working during times of the year when ecologically important aquatic species (including ESA-listed species) would not be in the area or in low abundance, and using a clamshell dredge, which has low entrainment potential. The maintenance dredging project would not negatively affect the present geomorphology of

northern Lake Washington. Noise and light impacts would be temporarily increased by the proposed dredging operation, but to a minor degree.

9. Comparison of No-Action and Preferred Alternative

Some effects to the human environment would be greater under the preferred alternative than under the no action alternative. A comparison of negative and beneficial impacts of both alternatives is presented below. This list may not be exhaustive, but provides a thorough overview of the most significant potential impacts.

Table 9-1. Comparison of impacts of alternative actions.

No Action Alternative	
Negative Impacts	**Beneficial Impacts**
Reduced vessel access to industrial park and eventually the marinas for recreational vessels	Less vessel traffic may lead to minor improvements of local air quality
Ongoing disturbance of benthic habitat by deeper draft vessels	EFH remains unaltered (excepting vessel prop disturbances)
Preferred Alternative	
Negative Impacts	**Beneficial Impacts**
Temporary and minor effects to water quality	Safe navigation for industrial and recreation vessels
Temporary reduction of benthic invertebrates	Continuation of industrial operations and associated local jobs
Temporary additional noise and underwater noise	Improved economic opportunities at Kenmore industrial park
Minor (*de minimis*) additions to air pollution	Long-term (~15 years) stability of benthic habitat through reduced prop disturbances
Measurable alteration of EFH	

The no action alternative would allow shoaling that would eventually reduce the human use opportunities in northern Lake Washington, while the preferred alternative would cause minor and temporary impacts to the environment. The no action alternative was rejected because it does not meet the purpose and need for the project. The preferred alternative (maintenance dredging and upland disposal) is recommended because it would fully achieve the project purpose. The preferred alternative would have a greater effect on the environment than the no action alternative, but effects would be minor and not alter the character of the human or natural environment. The preferred alternative would be cost effective relative to meeting the purpose and need of the proposed project, and would provide the greatest safety for industrial and recreational vessels and seaplanes using north Lake Washington. Although the preferred alternative would have a greater effect on the aquatic environment, work window restrictions and other mitigation measures would avoid or minimize impacts to species or their habitat.

10. Public Interest Evaluation Factors for Maintenance Dredging Activities

The USACE normally conducts an evaluation of the dredging and discharge activity in light of the public interest factors prescribed in 33 CFR 336.1(c). These factors typically include: navigation and the Federal standard for dredged material disposal; water quality; coastal zone consistency; wetlands; endangered species; historic resources; scenic and recreation values; fish and wildlife; marine sanctuaries; and applicable state/regional/local land use classifications, determinations, and/or policies. These factors are considered with respect to the effects of disposal of dredged material. As described in section 2.2 there will be no discharge of material into waters of the U.S. Due to this determination, dredging and upland disposal represent the least costly option consistent with engineering requirements and conducted in an environmentally acceptable manner. Because there is no discharge to waters of the U.S., accordingly no public interest review was conducted beyond what was evaluated in this EA.

11. Summary

As described, the proposed Federal action of dredging for channel maintenance with placement of dredged materials at an upland site would not have significant impacts to the quality of the human environment of northern Lake Washington and the mouth of the Sammamish River. The BMPs listed in section 2.3 are sufficient to avoid significant impacts to natural resources.

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Appendix A
DMMP Sediment Suitability Determination

Appendix B
Water Quality Monitoring Plan

Appendix C
Endangered Species Act – Agency Letters

Appendix D
Air Quality – Air Emissions Calculations

Appendix E
Coastal Zone Consistency Determination and Conditional Concurrence

Appendix F
Cultural Resource Letters

Appendix G
Public Comments on Draft EA