CONFLUENCE
ENVIRONMENTAL COMPANY

Vashon Kelp Forest

CRITICAL AREAS IMPACT ANALYSIS REPORT

Prepared for:

Vashon Kelp Forest, LLC

June 2022

146 N Canal St, Suite 111 • Seattle, WA 98103 • www.confenv.com

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Prepared for:

Vashon Kelp Forest, LLC
908 18th Avenue East
Seattle, WA 98307
Attn: Michael Kollins

Authored by:

Phil Bloch and Calvin Douglas
Confluence Environmental Company

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1.0 INTRODUCTION

This document assesses the potential critical areas impacts of the proposed Vashon Kelp Forest Project (project) located in Puget Sound, west of Vashon Island in King County. The information provides support and justification for project compliance with King County Code (KCC) Critical Areas Chapter 21A.24 and Shoreline Master Program (SMP).

Under the KCC, impacts to the shoreline environment must be minimized and mitigated to ensure no net loss of shoreline ecological function. A critical area report with an impact analysis is required to demonstrate project compliance with the mitigation sequence measures of KCC 21A.24.125 and KCC 21A.25.080. Compensatory mitigation must follow the mitigation standards for aquatic areas in KCC 21A.24.380.

The project occurs in areas designated as Aquatic under the Shoreline Master Plan and is primarily adjacent to Rural Residential shoreline designations with a portion of the bay near Fern Cove designated as conservancy (Figure 1).

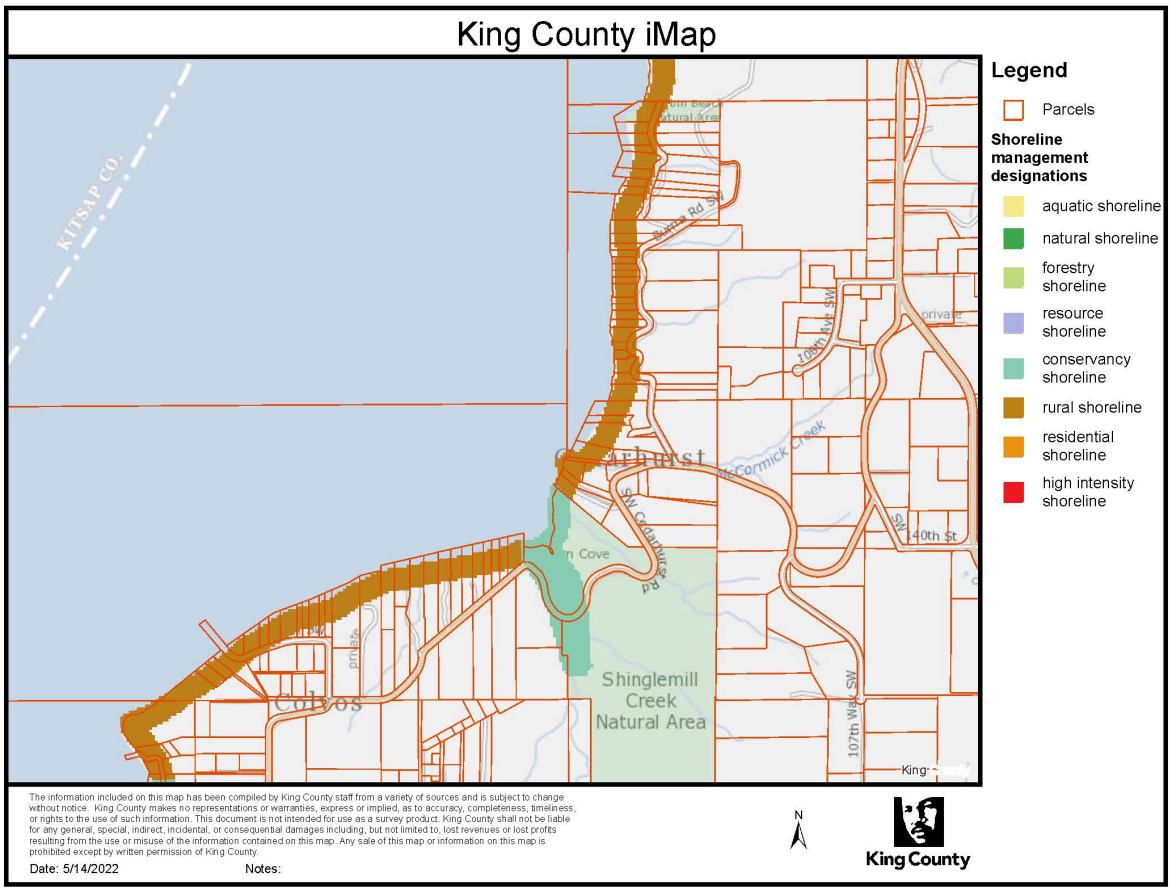

Figure 1. Shoreline Management Designations in Project Vicinity.

2.0 PROJECT DESCRIPTION

The proposed project is a mariculture farm that will grow the Puget Sound native kelp species sugar kelp (*Saccharina latissimi*) and bull kelp (*Nereocystis luetkeana*). The shoreward boundary of the project site is between 1200 and 1800 feet west of the Vashon Island shoreline along Colvos Passage. The project is designed to support rebuilding native kelp forests in Central Puget Sound by providing a source of propagules to support naturally occurring kelp beds in the vicinity, while providing a learning platform for collaborating with local universities and non-profit organizations. These efforts will be supported by growing kelp for harvest for commercial uses including a range of food and non-food products. Specifically, the proposed project includes the following elements.

Rebuild the kelp forest:

- In the face of the massive decline of kelp in Puget Sound recent analysis show a decline 90% of bull kelp in south and central Puget Sound in the last 150 years. The project will work to mitigate the decline. This is critical, as kelp serve as a vital ecological component in the Puget Sound ecosystem. These kelp forests provide an important habitat for many fish species, including several that are considered endangered or threatened under the Endangered Species Act. Additionally, marine vegetation like kelp can also be a tool in the fight against climate change, as they can sequester carbon.

Provide a learning platform:

- The project will partner with research organizations and universities to characterize the benefits to historical kelp beds around Vashon Island as well as any effects on key marine species like Coho (*Oncorhynchus kisutch*) and Chum Salmon (*Oncorhynchus keta*) that spawn on Vashon Island.

- Evaluate the level of carbon capture of seaweed farming in Puget Sound. This information is critical to research as seaweed may be a key tool in humans mitigating climate change and ocean acidification.

Growing kelp for harvest:

- The project will grow kelp for commercial uses. Harvested kelp from the project will be used as an input into a range of food and non-food products. While the range of beneficial and natural products is huge, initially the focus will likely be on compost/ fertilizer and as an input for kelp snacks for human consumption.

2.1 Installation

The project will cover a 10 acre (435 feet wide by 1000 feet long) subtidal parcel at water depths ranging from approximately -45 ft to -100 ft mean low low water (MLLW). Along the shorter

end of the rectangle (the north and south boundaries), a total of 44 helical anchors (22 on each end of the rectangle) will be installed into the seabed along of the farm to anchor kelp lines. These anchors will support near surface lines used to cultivate kelp that will be held approximately 7-feet below the water's surface using dropper buoys. A total of 22 kelp growing lines will extend along the long axis of the project extending approximately 1000 feet from anchor to anchor. These anchors will be connected by PVC line to polyform A3 buoys and dropper buoys along the length of the farm. An additional 8 helical anchors will be installed to support private aids to navigation (PATONs) on floating buoys as directed by the United States Coast Guard. Anchors will be installed by hand by scuba divers and will be removed at the conclusion of the project. Kelps will be raised in annual crops on the kelp growing lines.

2.2 Operations

Kelp will be planted in November and harvested in March/April. The site will be accessed by boat. The project is anticipated to use an approximately 25-foot work vessel that will have permanent moorage in Quartermaster Harbor. Work vessels may also make transits to Eagle Harbor or Bremerton. The project is anticipated to generate up to 1 vessel trip to/from the site per weekday during operations.

2.3 Avoidance and Minimization

The project has avoided and minimized impacts to the surrounding environment through project design and siting. Relative to the size of the farm, the proposed substrate modification is small and limited to the areas of anchoring in a sand and mud substrate. An underwater video field evaluation of the site has been completed that documents that eelgrass and macroalgae are absent from the site and adjacent to the site (Confluence Environmental Company 2022). Therefore, the project is not anticipated to adversely impact eelgrass or macroalgae satisfying KCC 21A.25.110.W. The project is expected to potentially benefit macroalgae by providing a potential source population for suitable habitats down-drift from the site where propagules may establish and grow on suitable habitats. Furthermore, substrate modification is limited to the maximum extent practical through the use of helical screw type anchors into sand and mud substrate for the project, thereby satisfying KCC 21A.25.110.A.

Operations of the farm are expected to have limited impact, with potential ecological benefits. Once the anchors are installed, operational impacts to the substrate will be negligible. Minor impacts due to boat use and maintenance activities may occur (refer to Section 4), but these would be temporary and infrequent. Seaweed and shellfish aquaculture are largely noted as providing benefits to the surrounding ecosystem (as reviewed in Theuerkauf et al. 2022), with few negative implications. Given the limited potential for impact and the efforts taken to further minimize the effect, the proposed project is considered to be in compliance with the mitigation sequence as outlined in KCC 21A.24.125 and KCC 21A.25.080.

In addition to the above avoidance and minimization elements, the following conservation measures are included within the proposed project:

- The project will use helical anchors that are removable.
- The project uses lines that are held below the water's surface using dropper buoys to maintain the lines used to grow kelp at approximately 7-feet below the water's surface.
- While the project is designed to minimize interaction with the public surface water, surface markers are proposed to delineate the site and to avoid conflicts with fisheries and vessel traffic.
- The project will only raise kelp species native to Puget Sound
- No artificial foods will be used; No pesticides or herbicides will be used
- The Vashon Kelp Forest relies on naturally occurring nutrients, light and high water quality found at the site.
- Site has been identified that is far from shore and access to the site will be limited to boats
- Kelp will not be harvested if fish eggs are detected on kelp. A 2-week pause will occur after detection to allow eggs to mature before re-inspecting gear and if eggs are absent or hatched, restarting harvest.
- The project will limit fishing and crabbing activity within the project boundaries due to the presence of gear and potential for fishing gear to become snagged on kelp farm gear.

3.0 ENVIRONMENTAL BASELINE

The project is located more than 1200 feet from the Vashon Island shoreline. Shoreline vegetation is typical of that found on beach shorelines and bluffs in the Puget Sound region with a mix of managed residential and native vegetation communities. Dominant vegetation includes Douglas fir (*Pseudotsuga menziesii*), Pacific madrone (*Arbutus menziesii*), big-leaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), vine maple (*Acer circinatum*), Himalaya blackberry (*Rubus armeniacus*), and ferns of various kinds. Residential development is located along the shoreline with ornamental tree and shrub plant species and mowed lawns. Many of the residential properties include bulkheads. Public roads are located inland of the shoreline.

The substrate at the project site is sand and mud. Eelgrass and macroalgae are absent from the site and adjacent to the site (Confluence Environmental Company 2022).

The proposed site is not regularly used for commercial marine navigation or for commercial fishing/crabbing/shellfish. It is, however, used for recreational boaters (power, sail, kayak/canoe) and recreational fishing may occur. It is rarely used for recreational crabbing.

4.0 IMPACTS ANALYSIS

As defined in KCC 21A.24, King County regulates a variety of different critical areas, including geologically hazardous areas, wetlands, and aquatic habitats. The only critical areas that the proposed project has the potential to impact are aquatic areas. Puget Sound is Type S aquatic area and is therefore regulated under King County's Shoreline Master Program (KCC 21A.25), in accordance with chapter 90.58 RCW.

The following discussion focuses on potential impacts to aquatic areas, specifically potential critical saltwater habitat. As defined in KCC 21A.06.261, critical saltwater habitat is "all kelp beds, eelgrass beds, spawning and holding areas for forage fish, such as herring, smelt and sand lance; and subsistence, commercial and recreational shellfish beds; and mudflats, intertidal habitats with vascular plants and areas with which priority species have a primary association." There is no forage fish spawning identified within the vicinity of the proposed project site (WDFW 2022). The closest documented spawning is for surf smelt, approximately 1,200 feet south along the shoreline (Figure 2). Consistent with DNR surveys (WDNR 2022) and documented in the underwater video survey (Confluence Environmental Company 2022) associated with the project, there are no eelgrass beds within the proposed project site or adjacent. The closest eelgrass beds identified by DNR are along the Vashon Island shoreline, more than about 600 feet from the project site. Additionally, as the site is subtidal, there are no intertidal areas have been identified within the proposed area.

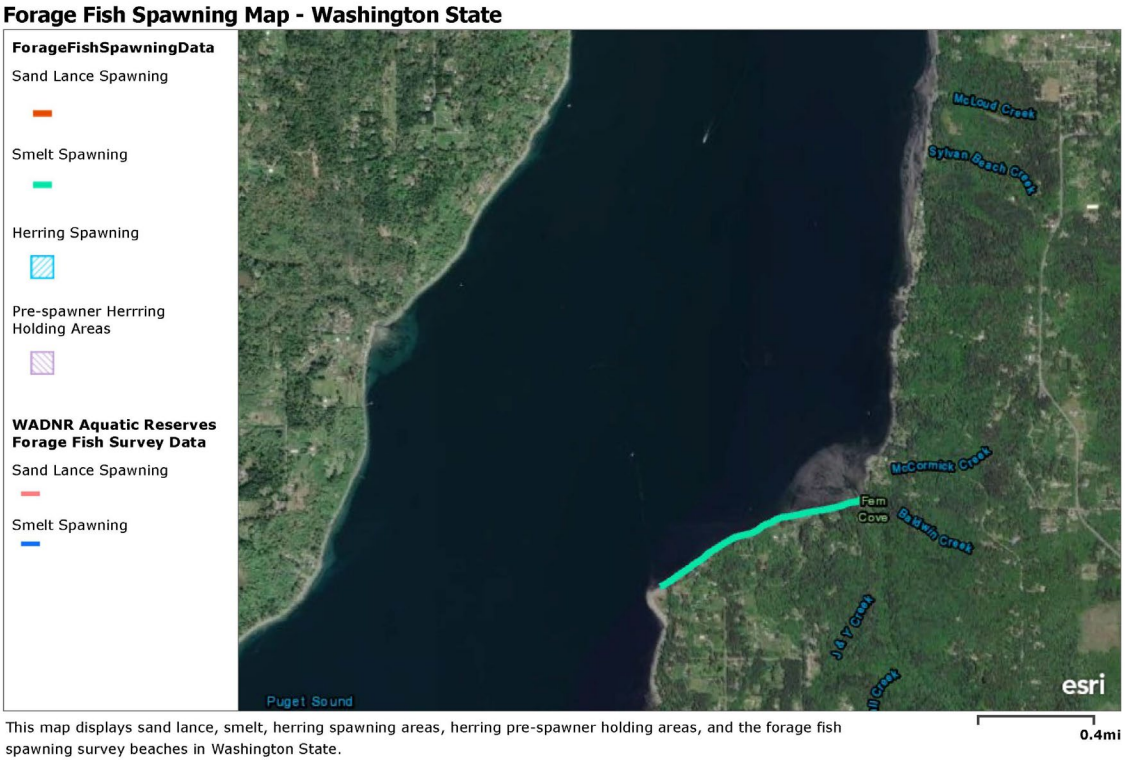

Figure 2. Mappped Forage Fish Spawning Beaches in Project Vicinity (Source: WDFW)

Most subtidal areas around Vashon Island between -18 and -70 ft MLLW are designated as geoduck tracts. The tract under and adjacent to the proposed project is identified as tract 9440 (Fern Cove) (Figure 3). The most recent reporting by WDFW identifies this tract as 'in recovery' meaning that it is not currently subject to harvest, but may reach harvestable densities in the future. The site has been characterized as a potential 'fast-recovery' site based on past harvest monitoring (Orensanz et al. 2000). The project is not expected to impact geoduck resources, however the presence of gear may interfere with harvest efforts in the project footprint since harvesters typically use surface support. Vashon Kelp Forest will continue to coordinate with Washington DNR and/or Tribal co-managers to minimize and avoid potential conflicts between the Vashon Kelp Forest project and the geoduck resources. If co-managers schedule a geoduck harvest for the area near the Vashon Kelp Forest project, the project will coordinate on the timing of the harvest and if necessary, will remove lines from the project to facilitate harvest access.

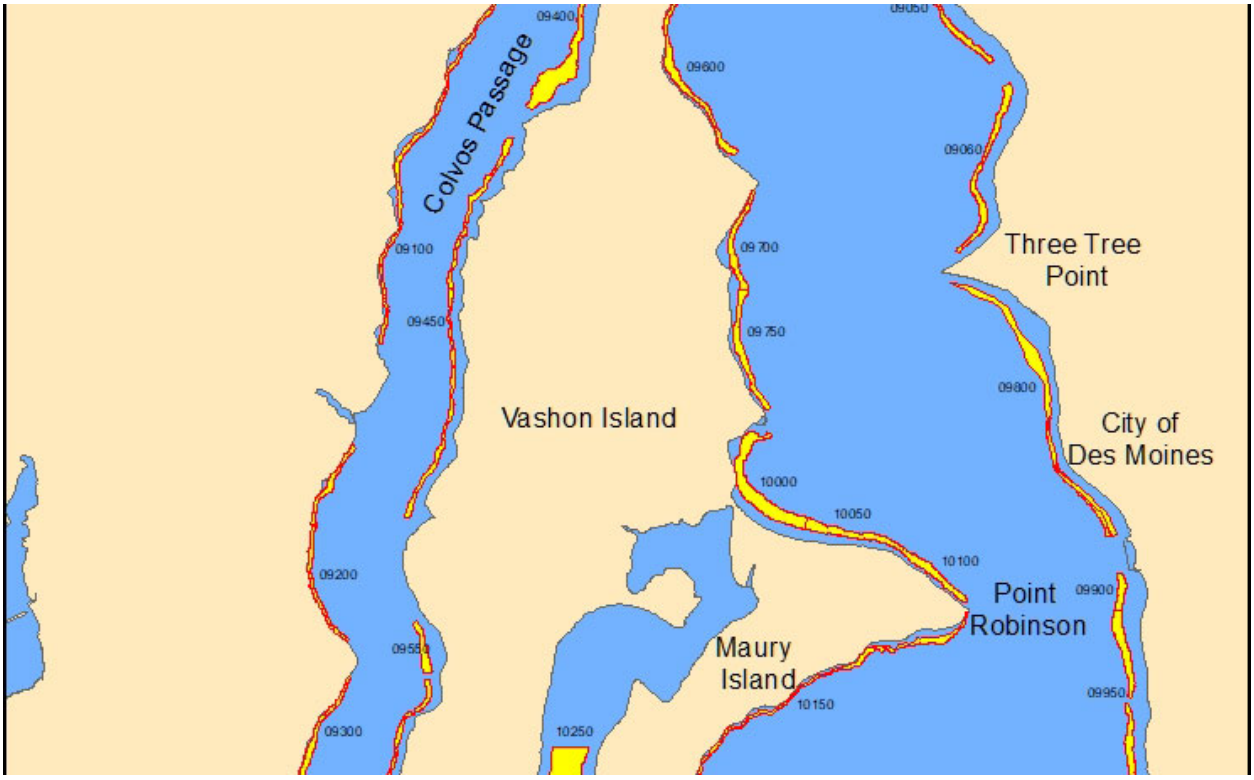

Figure 3. Mappped Forage Fish Spawning Beaches in Project Vicinity (Source: WDFW)

No potential critical saltwater habitat that may be impacted by the proposed project is identified in the vicinity of the project site.

Operational impacts would be restricted to presence of buoys and boat use for maintenance. Boat use is unlikely to result in impacts to existing macroalgae resources but could result in temporary disturbance of priority species within the vicinity of the project. Buoys are integrated into the grow lines and would not have the scope associated with mooring buoys, limiting the spatial extent of impacts. Mid-line floats would additionally minimize any scour impacts. Based on a review of relevant literature, the grow-out of the cultured seaweed is likely to provide ecological benefits with few associated impacts (Theuerkauf et al. 2022).

5.0 CONCLUSION

The proposed project is sited so as to largely avoid critical saltwater habitats. No eelgrass, bull kelp, forage fish spawning, or shellfish resources occur within the project site or vicinity. Impacts of the proposed project would be limited to minimal substrate modification associated with the anchors and temporary disturbance associated with boat use.

6.0 REFERENCES

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