

Chuckanut Community Forest Restoration Design Project

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Introduction

The Chuckanut Community Forest is a well loved place and is connected to several neighborhoods in Fairhaven, south of Downtown Bellingham. Chuckanut Community Forest (CCF) has a diverse trail system intertwined through large forested areas, wetlands and three watersheds, all covering a total of about 3.6 miles of trail (Essinger, 2017). Some larger primary trails were once small roads traveled by vehicles after the ridge had been logged, thought to be in the 1920's and 1930's. Since then, and after recent land use battles, the community now heavily uses the trail system for recreation, a chance to get outdoors and connect with wild flora and sometimes fauna. The proximity of CCF to Chuckanut Mountain and the extending Larabee State Park to the south increase the richness of this forest, however its integrity is slowly, "being loved to death", explained Dr. McLaughlin. In order to uphold the diversity of this forest and have visitors get maximum enjoyment from visiting, I have assessed the area and come up with several ways to mitigate visitor impact and restore forest integrity. In this assessment you will find insight on: restoring compacted soils through trail removal or narrowing, restoring vegetation, a description of strategies and structure used to mitigate trail use impacts, restoring hydrologic connections and overall maintenance in years to come. If the Chuckanut Community Forest restores and reestablishes it's ecological integrity it will be a recreation and outdoor oasis for local and far-traveling visitors like no other, for many years to come.

Cited:

Essinger, A. 2017. *Chuckanut Community Forest Baseline Report*. prepared for Chuckanut Community Forest Park District, Bellingham, WA. [online]
<https://www.chuckanutcommunityforest.com/files/CCF-Baseline-Documentation-Report-Final-5-8-17.pdf>

(1) Restoring Compacted Soils

→ Compacted soil puts limitations on plant growth as well as soils ability to retain water, key soil nutrients and avoid erosion. To mitigate and restore compacted soils, we should focus on narrowing larger primary trails, removing smaller trails and installing boardwalk/raised walking paths. The large/medium sized paths that need to be narrowed are highlighted in pink. Segments of the trails highlighted in brown are in Wetland Delineations and require a raised boardwalk path or bridge to halt further compaction and widening of the trail.

Trailheads bisected with red lines through them are to be removed. We must put in proper signage at all trailheads to Chuckanut Community Forest (CCF) with a small placard indicating restoration effort, the need for people to respect boundaries and requests that animals stay on leash. To start the restoration of compacted soils

we will need to seed native grasses, ground cover, and pioneer plant species along paths as well as temporarily flagging paths to indicate their boundaries. Designation of planted areas is addressed in Section 2 of the report. To increase permanence of narrowed trails - ie. along the perimeter of wetland buffer KK to the southeast - we may need to consider installing short reclaimed wood as fencing that acts as a natural physical barrier. Each of large-medium trails to be narrowed will ideally be shrunk to a 92cm wide trail. Trails to be removed will be blocked with tape and/or fallen branches, be planted according to Section 2, and have signage at the beginning of each trail indicating its closure. There will be multiple flagged locations within the closed trails that will act as monitoring sights for soil compaction, soil aeration, nutrient density and water holding capacity. To restore compacted soils within delineated wetlands a 92cm wide raised boardwalk will be installed to deter further compaction. In areas such as the connection of JJ1 to KK, AA to AY, and CC1 to DD and EE we may need to enclose the boardwalk with a handrail to deter people from jumping off paths. In delineated wetlands and buffers, native plants should also be installed about 1 per 1m radius. Deterring trail use will be the main means of alleviating soil compaction, though added leaf litter and organic matter will aid in timely progression and restoration.

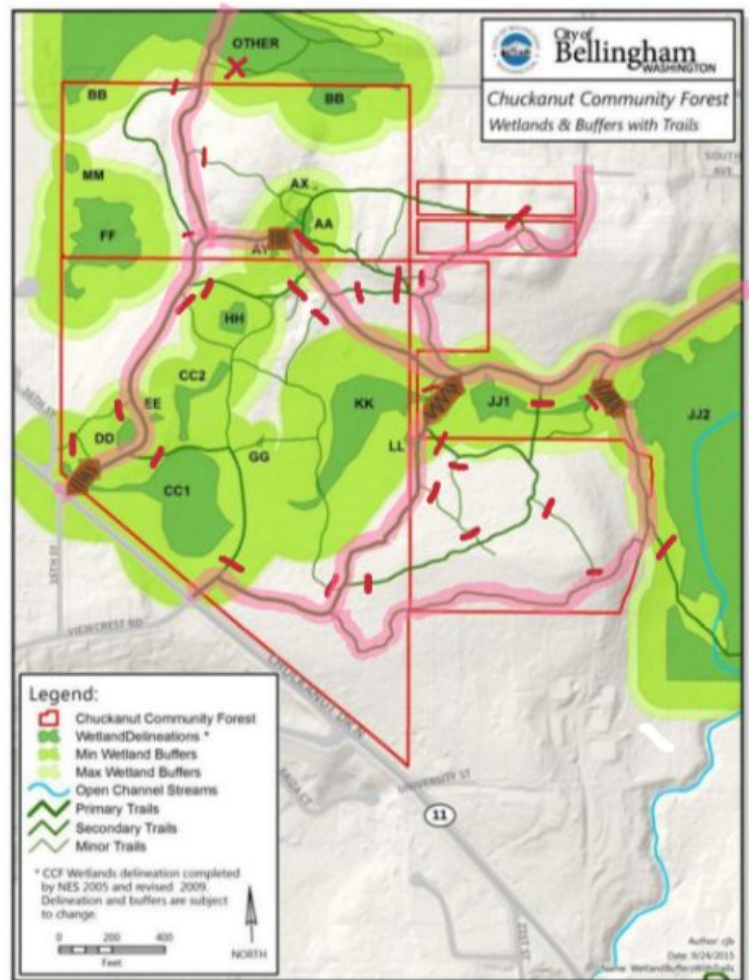


Figure 1.0 Reducing Soil Compaction through Trail Narrowing & Removal

(2) Restoring vegetation and targeted species/growth forms

→ Restoring vegetation and native plants will be a critical part of the overall restoration plan of the Chuckanut Community Forest. To do so we should focus on two different categories of native species: coastal forest natives, and wetland natives. Figure 2.0 indicates areas to be restored with coastal forest natives by highlighting and numbering locations in yellow, and with forest wetland natives species indicated with blue highlighting and numbering. All numbering is assessed in order of increasing importance, 1 being most critical to restore and 7 being lesser. All entrances (marked with purple) will need active removal of invasive species so seed does not spread, as well as deterrents in the form of boot scrubs for visitors to use. Plants will need to be installed from early winter to late spring, seeding is season and plant dependent. Planting will be

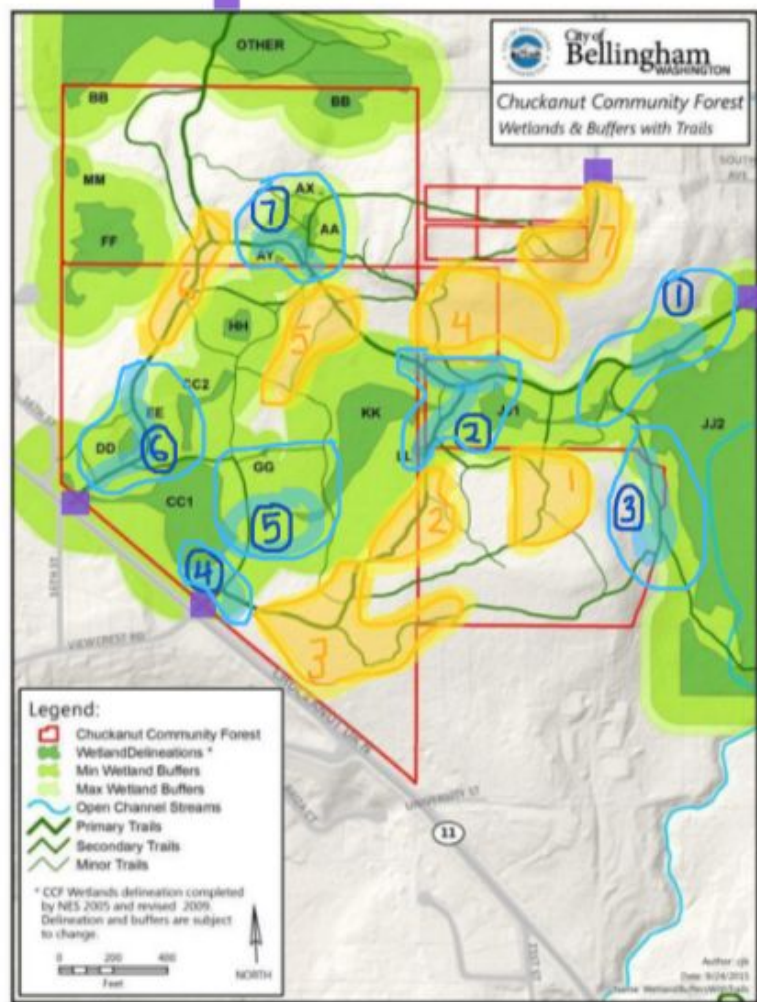


Figure 2.0 Restoring Vegetation

categorize types of plant by degree of slope, amount of sun and other intact competition. In addition to planting in designated areas, large shrubs such as Salmonberry, Red Flowering Currant, Sword Fern and Vine Maple will be planted at closed trail heads to prevent further use. Coastal forest natives to be planted (in areas marked with yellow numbers): (Trees) Big Leaf Maple, Black cottonwood, *Western red cedar, Red alder, *Vine maple, Bitter cherry, Hazelnut, (Shrubs) Oregon grape, Red flowering currant, Red huckleberry, Salal, Snowberry, Indian plum, Thimbleberry, *Devil's Club, Serviceberry, (Ground Covers) False lily of the valley, False Solomons seal, *Trillium, *Vanilla leaf, Wild ginger, Violets, Inside-out flower (Ferns) Licorice fern, *Sword fern, Wood fern, *Deer fern, and (Vines) Honeysuckle. *may be planted near water. (PNW NPS, 2020)

Wetland natives to be planted (in areas marked with blue numbers): (closest to wetland) Skunk cabbage, Spikerush, Soft rush, Sedges (many kinds), (indicators of wetland and buffers) Douglas spirea, Sweet gale, Salmonberry, Vine maple, Indian plum, trailing blackberry, false lily of the valley, red elderberry, large-leafed avens, lady fern, sword fern and piggy-back. (Essinger, 2017)

(3) Structures and Strategies for closed trails → As explained in the section addressing restoration of compacted soils (1), closed trails will need to be monitored, explicitly blocked and marked with their closure and a reason. All large closed trails will have a short rough cut timber fencing in front of the trailhead with a sign stating “Ecological Restoration of [Wetlands or Forest] in Progress, Thank you for respecting trail closures”. All secondary and minor trails that are closed will have either a rope or tape with the same sign as stated above. As indicated in Section 2, all closed trails will also have minor planting done at the trailhead. At all entrances to CCF there will be explicit information regarding trail reconstruction and ecological restoration and monitoring. On these signs we will also indicate a few key reasons for the need of restoration including: soil compaction, wetland restoration, habitat restoration, native plant planting and invasive/exotic species removal, as well as the estimated duration of closure, whether it be definite or temporary. Fencing materials will stand no taller than a half meter and timber used, will be locally attained and not contain any harmful carcinogens or preservatives that may leach into the nearby wetlands, watershed or effect plant growth and restoration efforts. If boulders or fallen trees are on site, and will not tamper with habitat restoration efforts, they may be used to block trails. Making it difficult to access closed trails will be of utmost importance as it will be the most successful at deterring further damage to the ecological integrity of CCF.

(4) Structures and Strategies for narrowed trails → As stated in section (3) all narrowed or closed trails will be indicated by information boards at all trailheads of CCF. Many of the primary paths within CCF have been used considerably over the years so trails have had extensive weathering, compaction and widening. To relieve stress on the environment we will need to narrow trails (as indicated with pink highlighting in Figure 3.0) and in order to enforce the newly narrowed trails we must have fencing to deter people from stepping off trail. To further deter people from widen paths, there will be vegetation planted every with a density of 1 plant per 1m radius. Plant type will be dependent on land type designation. Blue cones may be used if absolutely necessary, although it should be noted that most plantings will be done within an area already designated as ‘restoration in progress’ with temporary flags, rope or permanent fencing that should aid in deterring people from stepping out of designated paths.

(5) Trail-Wetland Mitigation

Structures → To mitigate compacted soil in wetland buffers there will be boardwalks and one bridge built, as well as active restoration to the hydrologic connections. All boardwalks to be built are indicated as brown highlights with black stripes. The one bridge will be between wetland JJ and KK, indicated with brown highlight and black zigzag. Hydrologic flow is indicated by blue arrows and restoration of hydrologic connections is indicated by light blue highlight and in the direction of hydrologic flow. The far east entrance from 24th Street and the Interurban, has a trail that ascends upward with a steady incline on the right and a lower wetland on the left. In this section we can use half meter tall fencing on the south side of the trail to keep people off the wetland and on the designated flat trail. To ensure that people do not extend the trail up slope there will be signage at the entrance encouraging visitors to stay on path. There is a trail that forks to the south about 200m up the trail and there will be a 20cm tall raised boardwalk, 92cm wide and 5 m in length. Under this boardwalk restoration of hydrologic connections will be aided through the addition of locally collected organic matter and broadfork use to decrease soil compaction. Up the primary trail where wetland buffers JJ and KK connect we have a very flat open space that allows for too many options of trail use so we will install wooden fences on either side of the trail to allow vegetation to be restored, as well as construct a bridge that goes south between wetland JJ and KK. To comply with ADA standards and insure all visitors have equal access, the bridge will be 122cm in width, extend 10m in length and will sit at 20cm tall at the middle point of the bridge, giving a minor slope from either end of the bridge. Under and around the bridge there will be plantings as mentioned in Section 2, a collection of leaf litter to increase organic matter content of soil and broadforking to alleviate compaction of soil. There will be 2 other boardwalks, both with the dimensions of 10cm tall, 5m long and 92cm wide: one over primary trail in wetland AY, and one at the south western entrance across from Viewcrest Rd.

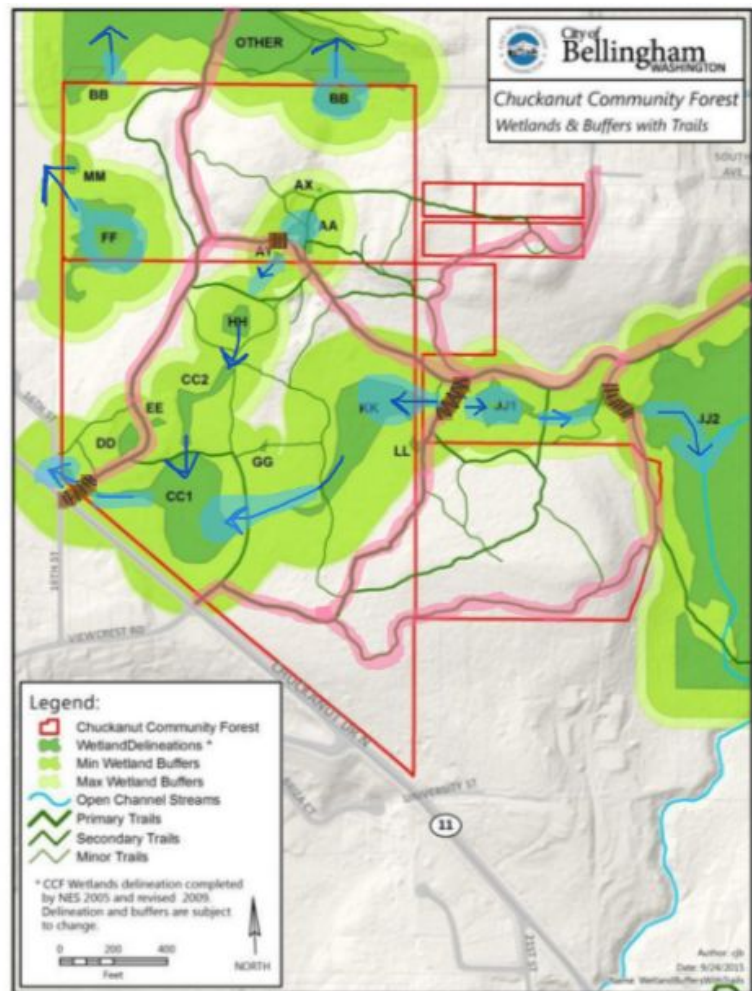


Figure 3.0 Mitigation Structures & Hydrologic Connections

(6) How to restore hydrologic connections → The process of restoring hydrologic connections will be primarily done through the removal of trails and installation of raised boardwalks and one bridge. To restore hydrologic connections we must also restore the habitat that supports water flow, water holding capacity and nutrient cycling. This will be done through planting native trees, grasses/sedges, and shrubs. There are also drainage ditches in CCF that were not permitted and once filled, the hydrologic connections will regain capacity required to function independently. Hydrologic connections may also be restored once organic matter percentages increase in areas that were once compacted due to trail use. Higher percentages of organic matter have a higher water holding capacity so planting native species is highly encouraged and will not only add to the overall forest integrity, but will aid in sustaining it's integrity. Such species include: *Thuja plicata* (Western Red Cedar), *Rubus spectabilis* (Salmonberry), *Rubus nutkanus* (Thimbleberry), *Populus trichocarpa* (Black Cottonwood), *Acer macrophyllum* (Big Leaf Maple), *Carex lyngbyei* (Lingby's sedge), *Eleocharis sp.*(Spikerush). Subsurface flow has also been impeded through heavy trail use as well as a prior existing roat, so the physical use of a broadfork will be necessary to loosen up the soil while not disturbing the microorganisms currently residing in it. Machinery is too heavy to use on this project so hand tools will be used and may be transported with the aid of a bicycle trailer if needed. Hand tools and physical labor will be sufficient in restoration of hydrologic connection, but monitoring and deterring use of closed trails will also be necessary.

(7) In order to monitor and evaluate effectiveness of the restoration design project within the Chuckanut Community Forest we must dedicate a lead terrestrial ecologist, and wetlands expert to head continual assessments and report to the board of commissioners for the CCF Park District. We may seek the expertise of Western Washington University Huxley Ecology students to aid in the evaluation of wetland and forest ecology restoration efforts. Community supported maintenance, planting natives and upkeep of trails will also be necessary for the success of this project. Monitoring of CCF will include: soil porosity tests through percolation or penetrometer tests, soil organic matter testing and analysis, native and exotic plant counting, forest integrity assessment, watertable analysis.

For the first year there will need to be extensive monitoring to ensure that all new protocols and restoration efforts are being respected and design is being carried out as expected. Bimonthly there will need to be thorough surveying, this will include: soil compaction reports and analysis, native plant count survival and growth rate analysis and soil porosity tests. It will be important to see the changes that occur in these environmental analyses over the year and then years to come. In the years following the completion of the design, a 5 year and 10 year environmental impact statement will be necessary. This will include all analyses described above and any other that may seem pertinent in relation to Ann Essigners 2017 CCF Baseline Documentation Report. As the Chuckanut Community Forest Restoration Project proceeds, it will provide a positive example of ecological restoration in urban areas and may act as precedent for further city parks and wild recreation areas.