City of Puyallup Critical Area Report

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Purpose:

This report is prepared by Pierce County (County) Surface Water Management staff, to assist the City of Puyallup (City) with its Critical Area Reporting Requirements.

This following information is provided to fulfill the requirements of Code sections *21.06.1070 Critical Area Report requirements for fish and wildlife habitat conservation areas & 21.06.530 General critical area report requirements.* This report will address the critical areas along the upper reaches of Clarks Creek that are located within the City of Puyallup's jurisdiction.

Justification:

The City and the County seek to continue their annually coordinated program to conduct Elodea control treatments in Clarks Creek. The Elodea control and removal program has been operating for almost 30 years to control a native aquatic macrophyte that has become an instream stressor that significantly contributes to two (2) water quality impairments. The rampant growth and predominating presence of Elodea (*Elodea nuttalii*) throughout the mainstem of the Clarks Creek system creates dissolved oxygen (DO) excursions during the summer growth cycle. The Elodea also increases sediment loading because it slows instream velocities and impedes flow. Elodea has a significant diurnal effect on DO levels because of its daily cycles of respiration and photosynthesis. DO levels increase in the water column during the day to supersaturation when plants generate oxygen during photosynthesis and generally decrease at night when plants use up available oxygen through respiration. The TMDL states the overabundance of Elodea negatively affects DO concentrations found along the mainstem of Clarks Creek (Ecology, 2014). Ecology supports management strategies which serve to reduce Elodea because the Agency believes its respiratory cycles over tax the system's available oxygen and because it believes ongoing Elodea abatement will assist in the gradual decrease of Sediment Oxygen Demand (SOD) and channel substrate embeddedness overtime.

Since 1991, City and the County have worked under a 5-Year interagency agreement (No. SC-106018) to remove Elodea from throughout the mainstem of the Clarks Creek system. The City and the County updated their 5-Year interagency agreement (No. SC-106018) in 2018. In 2011, the City and the County began using a new aquatic plant removal method called Diver Assisted Suction Harvesting (DASH). This instream aquatic plant-removal technique was implemented based on the recommendations from the interagency Elodea Task Force. The Task Force was comprised of the following participants: Puyallup Tribe of Indians, WDFW, EPA, Ecology, WSU-Puyallup, Pierce Conservation District, USGS, City of Puyallup, Pierce County, local legislative representatives and the public. This group collectively discussed the Clarks Creek Elodea problem, evaluated the contributing factors, reviewed practices for control and abatement, and developed a set of recommendations for moving forward. DASH treatments are identified in the *Clarks Creek Sediment and Dissolved Oxygen TMDL Water Quality Improvement Report*

(Ecology Publication No. 14-10-030; Pp. 118-19) as the appropriate implementation action to satisfy the requirements of the Dissolved Oxygen Load Allocation.

Dash methodologies are not unique to Clarks Creek and have frequently been used in mid-west lake systems. Locally, DASH was examined in previous studies on the Chehalis River. It was thought that DASH could provide an incrementally progressive but effective approach for reducing Elodea's presence over time (Thurston County, 2010). DASH was reported as providing for a more durable and permanent solution to controlling the macrophytes presence, density and means for propagation. DASH was the preferred approach because it afforded a higher removal rate with less seed and vegetative fragment release. The City of Puyallup published a *Pilot Project After Actio*n *Report* describing the DASH process (Rodriguez, J. 2011). Based on the Elodea Task Force's findings, DASH was supported by the Puyallup Tribe of Indians (PTI) because it represented best-available-science and a new method that could provide greater control while creating less turbidity and detached organic detritus. For these reasons it was thought that DASH created fewer disturbing impacts to fish life history habitat requirements and tribal-owned hatchery operations. Since then, DASH has been used as the preferred method to remove Elodea and control its deleterious effects on water quality, sedimentation and aquatic habitat degradation.

Critical Area Report requirements (21.06.530- General critical area report requirements)

(1) If a critical area report is required pursuant to PMC 21.06.520, it shall contain all the information listed in this chapter and shall at a minimum include:

A. A detailed description of the critical areas and buffers on or adjacent to the project site, including the size, type/classification, condition, disturbance history, and functions and values.

Project Area location: The Clarks Creek Elodea Removal Project will remove Elodea along the 3.5-mile-mainstem of Clarks Creek. The linear project area extends through both the City's and County's jurisdiction. The northern (downstream) extent of the project area is located immediately east of the Hwy 167 & 66th Ave E intersection, where Clarks Creek empties into the Puyallup River at the Milroy Bridge (66th Ave Bridge) crossing. The southern (upstream) extent of the project is located 300 feet south of the 12th Ave SW Bridge. The project will take place in and on the waters of Clarks Creek and will not involve the construction of any facility or new access. This report will only address critical areas located within the City of Puyallup's Jurisdiction.

Critical Areas Identified: Several critical areas are known (mapped) to be located within 300 feet of the project area's boundaries. These include bordering wetlands, tributary creeks, the mainstem's shoreline, aquifer recharge areas and the 100-year floodplain but also designated volcanic hazard areas and other designated shoreline areas associated with urban-conservancy (see attached map of wetlands, streams, shoreline classification and flood zones). Some of these critical areas encompass the entirety of the 3.5-mile linear project area including the volcanic (lahar) hazard area and the aquifer recharge area. The

project also lies unavoidably within floodway and the 100-year floodplain. While these critical areas are acknowledged here, the project's activities will in no way alter these areas nor will they be impacted as the project is not introducing any new development, infrastructure or fill to the project area. The aquatic macrophyte abatement activities (i.e.: DASH) only occurs along the channel bed of the active channel between and below the OHWM of the left and right banks (aka within the existing "infrastructure" footprint of the stream).

Habitat Area: Clarks Creek is a perennial groundwater-fed tributary of the lower Puyallup River. The Clarks Creek watershed is located in the central, southeastern region of the Puget Sound lowlands. Clarks Creek is a productive salmonid stream that supports two hatcheries operated by the Puyallup Tribe and one state hatchery operated by WDFW. Clarks Creek supports seven species of anadromous fish (Coho, Pink, Chinook, Chum, Steelhead, Coastal Cutthroat, and Bull Trout). Chinook, bull trout and steelhead are designated as threatened by the National Marine Fisheries Service (NMFS) under the Endangered Species Act (ESA). The Puget Sound-Georgia Straits Coho salmon population is also listed as a species of concern under the ESA. Clarks Creek is on the State of Washington's 303(d) list of impaired water bodies because of low DO and sediment. The TMDL analysis conducted by Ecology determined low DO levels, excess sediment, the overgrowth of Elodea, and the lack of riparian shade have all combined to create conditions which fail to protect Clarks Creek's designated beneficial uses for core summer salmonid habitat, primary contact (swimming), and water supply (Ecology, 2014; Pierce County 2006).

Clarks Creek is considered priority aquatic habitat for these species. Adjacent to the stream in several areas are wetlands considered by WDFW to be priority habitat areas (WDFW PHS on the web viewer, 2022). These priority habitats are of high value given the overall degraded condition of freshwater habitat for salmon in the greater Puyallup River basin and limited off-channel habitat available to support certain life history requirements for the ESA species previously listed. Clarks Creek must continue to be capable of providing critical salmon refugia, spawning and rearing habitat for the region's salmonids.

The current overall condition of the habitat is poor, with several limiting factors, including a confined stream channel, lack of riparian vegetation, lack of off-channel habitat, poor water quality and the expansive growth of elodea (Marks et. al. 2021). The stream system lies entirely within a highly urbanized, heavily developed area and is heavily impacted by the effects of this urbanization through channel confinement and stormwater runoff. Upstream of the project area, the Puyallup Tribe of Indians run a salmon hatchery designed to provide an independent and self-sustaining fall and Spring Chinook program for tribal fisheries (Marks et. al. 2021).

Wetlands: Several wetlands exist immediately adjacent to Clarks Creek (See critical areas map). These wetlands have not been individually typed, delineated or rated for this project. The project activities and its sphere of influence will not impact any of the wetlands. No project activities will occur on, near or

over any existing wetland. Access point #2 will traverse near a wetland buffer at DeCoursey Park, utilizing an existing pathway with a hardened surface to access the creek. No wetland or terrestrial vegetation will be impacted, and no ground disturbing activities will take place in relation to any phase of the proposed activities. The City acknowledges all adjacent wetlands that border the fringes of the project area must be protected maintain the aquatic health and hydrologic function of Clarks Creek. Their preservation is of particular importance given the project's goal is to improve instream water quality.

Shorelines: The project is located entirely within the Urban-conservancy and Clarks Creek Shoreline areas. These are important designations for preserving the integrity and continuity of Clarks Creek's riparian habitat. These programmatic protections are in-place to limit any further development that may detrimentally impact the stream system and the riparian gallery that exist along it margins. While this project will take place within those designated areas, there is no development or disturbance associated with DASH operations that could impact the adjacent shoreline habitat.

B. A site plan for the development proposal showing the proposed development footprint and clearing limits, and all critical areas and buffers.

There will be no development, clearing or grading associated with this project's activities. The project requires a small barge that carries divers and suction dredging equipment down the channel to perform suction harvesting of Elodea. The barge floats during the entire operation and does not interact with the stream bed at any time. Divers then submerge below the water surface to hand-pull Elodea at its roots to remove it from the channel substrate. The diver then hand feeds the detached vegetative material to a 4" diameter suction hose which transports the material to the barge. The material is then transferred by the barge operator into porous bags to drain. The bags of Elodea are removed to predesignated areas along the shore where they are retrieved each afternoon and transported by truck on established roadways to a licensed disposal facility. Vegetative material capture screens-turbidity curtains are installed downstream of each day's work location when warranted and feasible. These instream BMPS are put in-place to capture any Elodea fragments that may escape the divers as they transfer the detached plant material to the suction hose. Each screen is installed to be fish passable. Launch locations for the barges are at established locations with pre-existing hardened surfaces. No new infrastructure of any kind is needed to support this project.

C. A description of the proposed storm water management plan for the development and consideration of impacts to drainage alterations.

A Stormwater Pollution Prevention Plan (SWPPP) is not necessary for this project. No ground disturbance will occur, there will be no alteration to any drainage courses, nor will any infrastructure or impervious surfaces be constructed as part of this project. Barge launching locations (ramps) include

permanent BMP's such as pavement with curb and gutter, and quarry spalls to prevent tracking of sediment. Fueling to operate the barge's suction motor occurs each morning. This activity deploys temporary containment BMPS and a multi-absorbent spill kit for emergency response. Barge operators will conform to the standard operating procedures (SOP) that are contractually in-place to emphasize procedural care and to assure the operational BMPs are directing the refueling process with a particular focus on spill prevention. The SOP will be on site and the City's field inspector will give special attention to overseeing these activities.

D. The dates, names, and qualifications of the persons preparing the report and documentation of any fieldwork performed on the site.

This report was prepared by the following Pierce County Surface Water Management staff. Charlene Poggensee is an Environmental Biologist with 7 years in environmental permitting, wetland delineation and environmental compliance monitoring. She has a BS in Biology and Environmental Sciences from the University of Alaska Anchorage and an MS in Biology from the University of Auckland. Ms. Poggensee is a CESCL, and a trained wetland scientist with significant project experience in stream and river restoration.

Timothy Hagan is the Clarks Creek TMDL Program manager. Mr. Hagan has 30 years of experience in integrated water resource management. Mr. Hagan is a soil and wetland scientist who works as a senior water quality planner in the Watershed Services Unit. Mr. Hagan has BS in Silviculture and Soil Science from Cal Poly Humboldt and a MA in Soil Biogeochemistry from the University of Nevada at Reno. Mr. Hagan is a CESCL, CPESC, QSD/P and a graduate of the UW Wetland Science and Management certificate program.

E. A detailed assessment of the potential impacts to critical areas and buffers resulting from site development.

This project will utilize the DASH method to remove the Elodea from the Clarks Creek channel bed. Elodea is a major contributing factor to poor water quality, and excessive fine sediment deposition along the mainstem of Clarks Creek. The project activities create temporary de minimis impacts to the channel substrate of Clarks Creek. As work occurs, the Elodea plants will be manually removed from the stream bed by divers and hand-fed into suction hoses to transport the material to the surface for disposal. This activity does create in some unavoidable localized turbidity, but it never exceeds 10 percent of background conditions. The City's field inspector monitors water quality prior to beginning work and measures instream turbidity downstream of each day's activities to document water quality standards are not exceeded. Shading out Elodea has been proposed as a method of control, and a 2012 study by the Department of Ecology explored the effectiveness of using riparian shade cover as a method of control. This study found that a closed riparian canopy that could provide effective shade of 85% would

create a partial control on Elodea. (Brock, 2012 Dept of Ecology shade study). Using shade to limit photosynthesis will help minimize the growth and expansion (propagation) of this aggressive aquatic macrophyte, but will not eliminate it. It will also not eliminate existing Elodea infestations, only inhibit future growth indicating that a method of removing Elodea from the stream is still necessary. And, although there is a dedicated program to recreate a contiguous riparian canopy, that desired future condition has not been achieved and it cannot be relied on to provide near term control. While this study indicated that shading may be beneficial in the control of Elodea, it has been difficult to implement. The Clarks Creek shoreline is primarily under private ownership and many of the local homeowners are unwilling to restore a riparian buffer along their shorelines (Rodriguez, 2011) or engage in activities to minimize Elodea growth. At present, DASH is the only accepted method approved for controlling Elodea.

To further minimize potential impacts, all work for this project will take place during the WDFW approved in-water work window from June 1st to July 31st. This is that limited window of time when fish are least likely to be harmed by instream abatement activities and has been determined by WDFW. Launching of the barge and personnel will occur at three established access points. No new access points will be established. (Please see map for creek access and barge launch locations)

This project will have minimal negative impact on any of the critical areas (see table 1) listed for this linear project area. No new infrastructure, development, clearing or impervious surfaces are being proposed and no development will occur, and as such, no alteration or disturbance to any of the adjacent critical areas is expected to occur.

Critical Area	**Project Impacts**	**Justification**
Wetlands	None	This project will not change or alter this critical area
Streams/Creek	Yes- restoration	This project will take place in and on Clarks Creek. It will modify the existing condition through the removal of Elodea
Aquifer Recharge Area	None	Project will not change or alter this critical area
Volcanic Hazard	None	Project will not change or alter this critical area
Flood zone	None	Project will not change or alter this critical area
Habitat Area	Yes- improvement	This project will improve habitat quality by removing Elodea monocultures
Clarks Creek shoreline	None	Development is not proposed with this project. No changes will occur to this critical area
Shoreline designated area	None	This project will not change or alter this critical area

Table1: Summary of impacts on critical areas.

The active channel of Clark's Creek is the one critical area that will experience some minor impact. Some fine sediment will be dislodged as the diver's hand-pull the plant at its roots but the City's turbidity data from the last 10 years of DASH clearly indicates it is consistently below the 10 percent of background standard (Appendix A). In the event that sampling indicates higher turbidity levels, work is suspended until measurements indicate that the turbidity has returned to state-standard level and BMP's reviewed. Work will only occur during daylight hours, and turbidity levels decrease to background once work has ceased for the day.

Impacts on listed species:

Species listed in the area who have potential to be impacted by the work of DASH include Bull Trout and their associated critical habitat; Chinook; Steelhead as well as non-listed salmonid species. Listed birds and mammals include North American Wolverine, Marbled Murrelet, Streaked Horned Lark and Yellow-Billed Cuckoo. For each of these species, the Clarks Creek corridor does not support suitable habitat for these species to occur and thus, this project will have no effect on them. Only aquatic species will be further addressed.

Species	**Impact**	**Justification**
Bull Trout	Not likely to adversely impact	Turbidity impacts are temporary and insignificant
Bull Trout Critical Habitat	Not likely to adversely impact	Turbidity impacts are temporary and insignificant
Chinook	Not likely to adversely impact	Turbidity impacts are temporary and insignificant
Marbled Murrelet	None	Lack of suitable habitat
North American Wolverine	None	Lack of suitable habitat
Streaked Horned Lark	None	Lack of suitable habitat
Yellow Billed Cuckoo	None	Lack of suitable habitat

Table 1: Listed species, critical habitats, and impacts summary

This project will create localized turbidity effects in the immediate vicinity of work which has the potential to impact listed species if they are present in close proximity to the work zone. The work will be confined to small reaches of approximately 100 yards of less of the approximately 3.5-mile total stream area, with turbidity impacts diminishing as distance from the work zone increases. The diver assisted suction harvesting crew and barge do not occupy the entire stream channel, nor do they preclude the movement of aquatic life to either pass by or escape the work zone. The work does not isolate or prevent fish passage in the stream, it has been observed that any fishes present in the area will move out of the area to avoid the divers. The work is isolated to short reaches of Clarks Creek at any one time with only 1-2 crew members working in water at a time, this limited sphere of activity enables the fish to easily practice avoidance because the vast majority of the 3.5-mile stream is open and available as a refugia.

Turbidity downstream of the work area is monitored by City of Puyallup field inspector to ensure that work does not exceed state water quality standards. Monitoring occurs twice daily during the project's activities. The first is the morning baseline reading and the second is taken downstream of the project area after the workday has been completed. It is likely that adult fishes have already experienced turbidity levels much higher than are being produced through DASH related activities as Clarks Creek does discharge to the Puyallup River, where fish can freely transit to and from, which has an innately high suspended sediment load given the glacial origins of the river. For adult fishes who have migrated from the Puyallup into Clarks Creek, any slight increase in turbidity levels will be lower than what the fish have experienced in the Puyallup River. Juvenile fish present in, at or around the work area will actively avoid the activity and move away from where the divers are working in the water. Fish will experience short temporary spikes in turbidity levels that quickly subside within a short period after the day's work has been completed and nothing will be in place to prohibit, limit or otherwise restrict free movement of the fishes from the sampling location. Turbidity measurements taken from the 2020-2022 DASH removal activities have been included in Appendix A.

Potential impacts may include a delayed increased in turbidity, arising from the removal of the Elodea root network that acts to hold the channel bed's fine sediment in-place. The removal of the roots via DASH could potentially make the fine sediment substrate more susceptible to hydraulic shear stress and entrainment into the flowing water column. This condition may promote the self-evacuation of fine sediment (i.e., iron floc, inorganic mineral particles and particulate organic carbon) by making it more available for transport out of the system, particularly when high precipitation events occur during the fall and winter months. The City of Puyallup has not confirmed this scenario is actually occurring or likely to occur for several reasons. The Clarks Creek basin is a very low gradient drainage basin, with slope gradients ranging from 0.5%-1% on average throughout the project area. This low gradient means that the velocity of the stream is typically very low. The 100-year flood event for Clarks Creek is estimated at just 288 cfs, which is slow for a stream of its size and limits the capacity for sediment transport and evacuation out to the Puyallup River. Table 2 outlines discharge measurements captured at multiple locations along Clarks Creek.

HSPF Reach (River Mile)	Location	Basin Area (sq. mi.)	Discharge (cfs)				Method
			10-yr	50-yr	100-yr	500-yr	
32 (0 – 1.3)	Mouth at Puyallup River to Stewart Avenue	10.62	231	291	315	369	HSPF – HEC-FFA
33 (1.3 – 1.6)	Stewart Avenue to mouth of Diru Creek	9.08	206	263	288	345	HSPF – HEC-FFA
34 (1.6 – 3.1)	Mouth of Diru Creek to 7th Avenue SW	8.69	203	260	284	342	HSPF – HEC-FFA
35 (3.1 – 3.8)	7th Avenue SW to 15th Ave SW	4.73	128	163	177	209	HSPF – HEC-FFA
38 (0.0 – 0.9)	Meeker Ditch	3.16	101	130	142	168	HSPF – HEC-FFA

Table 2: Discharge measurements for Clarks Creek system

Sediment in the stream system does shift and move along the bottom, but the fine suspended sediment is not likely to create a permanent plume effect that creates an ongoing impact for salmonids.

The delayed turbidity impacts are also unlikely to occur due to the regenerative growth of Elodea after DASH treatments. While Elodea does not recover to pre-Dash levels in the year post treatment, regenerative growth does immediately begin to occur with the macrophyte recovering some of the root mass. This is seen in dissolved oxygen measurements taken pre- and post-DASH treatments. Dissolved Oxygen data indicates that there is a rapid decrease in DO levels in the stream immediately after DASH treatments from the removal of photosynthetic biomass. Site specific data and modeling shows within a short period of time after DASH, the Elodea begins to regrow even as it heads into the fall and winter. This is indicated by the rapid rise in DO levels again (Figure 1). The data indicates that Elodea root masses are still present in the system and retaining the fine sediment along the channel bed. It is very possible that some fine sediment will dislodge given that there is less root mass holding the sediment in-place, but this would occur gradually given the low slope and velocity of the system.

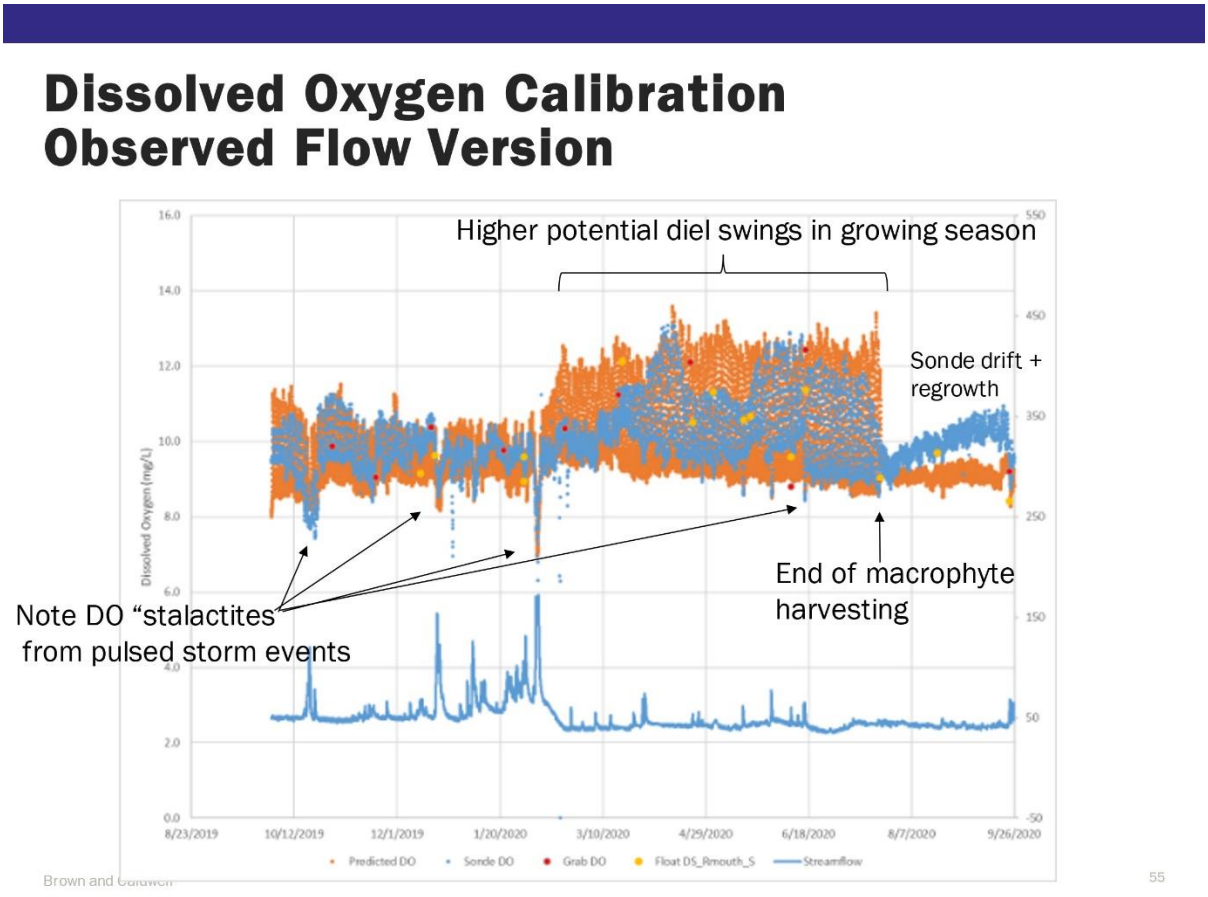

Figure 1: Dissolved Oxygen concentrations in Clarks Creek show marked difference in concentrations before, during and after DASH treatments. Note the increase in Sonde DO measurements increasing in the weeks post-DASH treatment, also indicating the regrowth of Elodea and its effect on DO.

The removal of Elodea, even for short periods of time, removes the aquatic monoculture that Elodea dominance imposed on the system. This may allow for the expansion of native benthic macroinvertebrate populations to recover from the plants suffocating effects. Benthic macroinvertebrates, especially EPT (Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies), are an important food source for juvenile salmonids and adults. The removal of Elodea may also open the thalweg for easier transit by adult salmon. This temporary condition during the fish window may help the fish expend less energy as they navigate easier access to the upper reaches of the stream and increases the likelihood of spawning success.

The turbidity impacts as indicated by the year-to-year project monitoring data associated with previous DASH treatments are minimal and temporally limiting in nature. The DASH project will affect, but *not likely to adversely affect* Bull Trout, Bull Trout Critical Habitat or Chinook Salmon.

F. An analysis of site development alternatives and measures taken to avoid and minimize critical area impacts; and

No site development is proposed for this project. As cited in the introduction, other alternatives to using the DASH method have been explored, but no other techniques were found to be more effective or least disturbing. The County and Ecology are currently operating under the assumption that DASH, as a temporary measure, is ecologically necessary and required by the TMDL to control DP impairments, especially under the low flow condition. This annual instream abatement program will likely continue until riparian shading and other more effective techniques can be effectively applied. Riparian shade will not eradicate Elodea, and it cannot be used as a removal method, but it can help inhibit the Elodea growth back to a more natural condition.

Other methods to minimize critical area impacts are as stated before; working within the approved WDFW in water work window when fish life is least likely to be harmed by work conducted; monitoring water quality while work is being performed and limiting work to a short stretch of the entire reach (<100 yards or so) giving aquatic life an opportunity to leave the area temporarily without impact.

G. Any additional information for the critical area as required by this chapter.

No additional information.

References

1. Brock, S. 2012. Clarks Creek Effective Shade and Elodea. Washington Department of Ecology Environmental Assessment Program.
2. Ecology, 2014. Clarks Creek Dissolved Oxygen and Sediment Total Maximum Daily Load: Water Quality Improvement Report and Implementation Plan. Department of Ecology, Southwest Regional Office, Olympia Wa.

3. Marks, E.L., R.C. Ladley, B.E. Smith, A.G. Berger and K. Williamson. 2020. Puyallup Tribal Fisheries Annual Salmon, Steelhead and Bull Trout Report: Puyallup/White River Waterhsed-Water Resource Inventory Area 10, 2019-2020 Puyallup Tribal Fisheries, Puyallup Wa.
4. Pierce County, 2006. Clear/Clarks Creek Basin Plan Volume 1 – Basin Plan and SEIS. Pierce County Public Works and Utilities, Water Programs Division. Accessed February 2013. http://www.co.pierce.wa.us/archives/102/Clear%20Clarks%20Creek%20Basin%20Plan%20Volume%20I.pdf
5. Rodriguez, J. 2011. Clarks Creek Elodea Hand Pulling Pilot Project: After Action Report for In-Stream Work. City of Puyallup
6. Thurston County Noxious Weed Control Board, 2010. Final Project Report for Agreement Number G0900221: Chehalis River *Egeria densa* control. https://www.cityofpuyallup.org/DocumentCenter/View/1161/Thurston-County-Elodea-Removal-Report-PDF?bidId=

Appendix A: Turbidity Data from 2020-2022 DASH Elodea removal events as collected by City of Puyallup. Original Excel file available upon request.

			INSPECTOR SUPPLIED INFORMATION				
	Time		Turbidity Results (NTU)			Gages (AM)	
Date	Start	End	AM Sample	PM Sample	Diff over backgrd (NTU)	12th Ave SW	Tacoma Rd
6/1/2022	0700	1500	1.23	6.88	5.65	24.31	19.36
	1030	1530					
6/2/2022	0700	1530	1.18	9.3	8.12	24.31	19.35
	0700	1530					
6/3/2022	0700	1530	5.61	18.1	12.49	24.43	19.48
	0700	1330					
6/6/2022	0700	1515	1.57	6.99	5.42	24.41	19.45
	0700	1530					
6/7/2022	0700	1530	0.58	7.69	7.11	23.91	19.44
	0700	1530					
6/8/2022	0730	1530	0.71	9.06	8.35	23.86	19.39
	0700	1530					
6/9/2022	0700	1530	1.18	na	na	23.84	19.45
	0700	1400					
6/10/2022	0700	1530	1.28	11.4	10.12	23.98	19.97
	0700	1530					
6/13/2022	0700	1530	0.36	9.49	9.13	23.93	19.5
	0700	1530					
6/14/2022	0700	1530	0.84	6.83	5.99	23.91	19.49
	0700	1530					
6/15/2022	0730	1600	1.51	9.29	7.78	23.91	19.47
	0700	1030					
6/16/2022	0700	1530	0.40	6.71	6.31	23.91	19.49
	0830	1600					
6/17/2022	0700	1530	0.58	8.71	8.13	23.91	19.48
	1230	1530					
6/20/2022	No work, holiday				0		
6/21/2022	0730	1900	0.64	6.97	6.33	23.91	19.48
	0700	1530					
6/22/2022	0700	1530	1.04	9.78	8.74	23.91	19.50

	0700	1530					
6/23/2022	0700	1500	5.07	12.4	7.33	23.91	19.51
	0700	1530					
6/24/2022	0730	1530	13.80	25.1	11.3	23.91	19.50
	0700	1400					
6/25/2022			0.72	4.12	3.4	23.91	19.47
	0730	1530					
6/27/2022	0700	1500	3.56	14.2	10.64	23.91	19.42
	0830	1730					
6/28/2022	0700	1600	2.56	21.2	18.64	23.91	19.50
	No work						
6/29/2022			4.03	na	na	23.91	19.49
	0700	1530					
7/5/2022			1.65	13.7	12.05	23.91	19.52
	0730	1600					
7/6/2022			2.83	12.3	9.47	23.91	19.54
	0715	1600					
7/7/2022	0700	1545	5.69	19.8	14.11	23.91	19.48
7/8/2022	0700	1530	0.64	6.97	6.33	23.91	19.51
7/9/2022	0700	1530	1.81	14	12.19	23.91	19.41
7/11/2022	0730	1600	2.02	12	9.98	23.91	19.35
7/12/2022	0700	1545	2.08	14.5	12.42	23.91	19.35
7/13/2022	0715	1545	2.42	6.08	3.66	23.91	19.27
7/14/2022	0700	1615	2.28	14.1	11.82	23.91	19.32
7/15/2022	0700	1615	3.75	5.98	2.23	23.91	19.29
6/1/2021	0800	1745	1.52	13.5	11.98	24.08	20.5
	0900	1600					
6/2/2021	0800	1730	0.47	na	na	24.08	20.53
	0800	1600					
6/3/2021	0900	1630	0.67	4.51	3.84	24.08	20.53
	0745	1500					
6/4/2021	0800	1700	0.33	9.47	9.14	24.08	20.6

	0700	1700					
6/7/2021	0800	1630	1.83	18.1	16.27	24.08	20.79
	0700	1700					
6/8/2021	0800	1800	0.92	2.91	1.99	24.08	20.68
	0700	1600					
6/9/2021	0900	1815	0.50	8.9	8.4	24.08	20.68
	0700	1715					
6/10/2021	0830	1815	1.37	32.1	30.73	24.08	20.63
	0700	1800					
6/11/2021	n/a				0		
	n/a						
6/14/2021	0830	1800	1.90	30.8	28.9	24.08	20.9
	0700	1200					
6/15/2021	0830	1630	1.58	21.5	19.92	24.08	20.85
	0700	1715					
6/16/2021	0830	1740	2.60	25.4	22.8	24.08	20.84
	0700	1715					
6/17/2021	0845	1730	1.53	34.06	32.53	24.06	20.83
	0700	1740					
6/18/2021	0830	1445			0		
	1115	1715					
6/21/2021	0830	1600	1.98	18	16.02	23.68	20.79
	0700	1530					
6/22/2021	0830	1558	1.00	6.13	5.13	23.68	20.86
	0630	1700					
6/23/2021	0830	1730	1.71	4.28	2.57	23.76	20.87
	0630	1540					
6/24/2021	0830	1630	0.84	40.5	39.66	23.62	20.85
	0630	1430					
6/25/2021	0830	1600	1.98	11.3	9.32	23.61	20.83
	0600	1320					
6/28/2021	0930	1545	1.17	13.6	12.43	23.68	20.92
	0630	1530					
6/29/2021	0930	1645	1.71	18.2	16.49	23.66	20.89
	0615	1530					
6/30/2021	0830	1650	1.55	10.6	9.05	23.71	20.89
	0610	1510					
7/1/2021	0830	1630	1.86	22.6	20.74	23.66	20.95
	0600	1500					
7/2/2021	0830	1650	1.86	14.5	12.64	23.66	20.95
	0630	1520					

7/5/2021	0830	1630			0		
	na	na					
7/6/2021	0830	1630	2.33	24.9	22.57	23.71	20.97
	0600	1345					
7/7/2021	0700	1300	1.57	20.4	18.83	23.71	20.98
	na	na					
7/8/2021	0730	1300	1.42	15.4	13.98	23.73	21.01
	0645	1930					
7/9/2021	0700	1830	1.98	11.1	9.12	23.61	20.83
	0910	1815					
7/12/2021	0700	1540	1.59	31.1	29.51	23.75	20.75
	1000	1830					
7/13/2021	0700	1600	1.86	32.9	31.04	23.8	20.75
	0830	1750					
7/14/2021	0700	1630	1.68	24.1	22.42	23.85	20.69
	0930	1840					
7/15/2021	0700	1730	1.65	26.9	25.25	23.83	20.53
	0945	1845					
7/16/2021	0700	1630	1.72	14.4	12.68	23.74	20.46
	0930	1930					
7/17/2021	0700	1630	2.00	20.9	18.9	23.81	20.38
	1030	1645					
7/19/2021	0700	1530	1.74	13.7	11.96	23.77	20.28
	1115	1940					
7/20/2021	0700	1700	2.37	20.5	18.13	23.82	20.20
	1100	2130					
7/21/2021	0700	1630	3.18	17.4	14.22	23.85	20.69
	1130	2115					
7/22/2021	0700	1700	2.81	12.1	9.29	23.82	20.05
	1100	2120					
7/23/2021	0700	1700	3.56	18.8	15.24	23.81	19.93
	1100	2100					
7/24/2021	na	na	1.84	61.4	59.56	23.79	19.86
	1120	2015					
7/25/2021	0700	1645	3.39	58.8	55.41	23.8	19.78
	1120	1700					
7/26/2021	0700	1700	4.74	20.8	16.06	23.81	19.74
	1120	2100					
7/27/2021	0700	1700	4.52	8.26	3.74	23.8	19.67
	1100	2115					
7/28/2021	0730	1600	4.31	38.6	34.29	23.78	19.55

	1105	2110					
7/29/2021	0700	1630	9.15	42.3	33.15	23.78	19.60
	1030	2120					
7/30/2021	0800	1630	11.9	15.2	3.3	23.81	19.59
	1200	2020					
7/31/2021	0700	1330	12.8	16.6	3.8	23.76	19.58
	na	na					
8/2/2021	0700	1745	8.71	31.2	22.49	23.76	19.51
8/3/2021	0800	1800			0		
8/4/2021	0700	1240			0		
6/1/2020	0800	1530	n/a	n/a	n/a	-	-
	-	-					
6/2/2020	0700	1700	0.7	11.4	10.7	23.86	19.87
	-	-					
6/3/2020	0700	1715	0.62	12.5	11.88	23.85	19.82
	-	-					
6/8/2020	0700	1600	0.87	9.76	8.89	23.88	19.91
	1100	1500					
6/9/2020	0700	1500	6.91	8.12	1.21	24.07	20.26
	0700	1500					
6/10/2020	0700	1400	1.3	17.9	16.6	23.89	19.95
	-	-					
6/11/2020	0745	1545	0.74	6.89	6.15	23.9	20.26
	-	-					
6/12/2020	0715	1530	0.81	35.8	34.99	23.87	19.99
	-	-					
6/15/2020	0700	1530	1.13	17.2	16.07	23.83	20.11
	-	-					
6/16/2020	0715	1530	2.33	5.63	3.3	23.91	20.16
	-	-					
6/17/2020	0700	1430	2.45	7.25	4.8	23.83	20.12
	-	-					
6/18/2020	-	-	1.13	na	na	23.85	20.10
	-	-					
6/19/2020	0700	1330	1.07	9.46	8.39	23.83	20.10
	-	-					
6/22/2020	0700	1530	1.89	14.7	12.81	23.81	20.10
	0700	1530					
6/23/2020	1045	1545	0.95	11.7	10.75	23.8	20.14
	1045	1530					

6/24/2020	0700	1545	1.29	16.1	14.81	23.78	20.13
	0700	1500					
6/25/2020	0700	1515	2.73	na	na	23.68	20.13
	0700	1530					
6/26/2020	0700	1530	1.56	15.5	13.94	23.68	20.15
	0700	1530					
6/29/2020	0700	1530	0.79	7.29	6.5	23.66	20.23
	0700	1530					
6/30/2020	0700	1545	2.45	19.4	16.95	23.67	20.26
	0700	1530					
7/1/2020	0700	1600	1.57	14.5	12.93	23.66	20.23
	0700	1545					
7/2/2020	0700	1530	1.83	9.68	7.85	23.65	20.35
	0700	1530					
7/3/2020	0700	1530	1.77	10.7	8.93	23.63	20.35
	0700	1530					
7/4/2020	0715	1530	2.14	12.7	10.56	23.63	20.40
	-	-					
7/5/2020	0800	1500	1.8	15.8	14	23.6	20.43
7/6/2020	0700	1530	1.45	7.33	5.88	23.58	20.41
7/7/2020	0700	1530	1.21	7.27	6.06	23.6	20.43
	0700	1530					
7/8/2020	0700	1530	2.64	4.83	2.19	23.57	20.54
	0700	1530					
7/9/2020	0700	1530	1.83	18.3	16.47	23.54	20.49
	0700	1530					
7/10/2020	0700	1530	1.9	5.96	4.06	23.52	20.57
	0700	1530					
7/11/2020	0700	1530	1.56	5.45	3.89	23.51	20.54
	0700	1530					
7/12/2020	0700	1545	1.58	na	na	23.51	20.59
	-	-					
7/13/2020	0700	1730	1.66	10.5	8.84	23.5	20.59
	0700	1530					
7/14/2020	0700	1700	2.17	16	13.83	23.49	20.55
	0700	1630					
7/15/2020	0700	1600	2.13	27.1	24.97	23.48	20.59
	0700	1600					
7/16/2020	0700	1700	2.18	16.1	13.92	23.46	20.52

	0700	1700					
7/17/2020	0700	1700	2.98	24.6	21.62	23.4	20.53
	0700	1700					
7/18/2020	0745	1945	1.71	14.6	12.89	23.43	20.54
	0745	1945					
7/19/2020	0730	1330	2.53	4.71	2.18	23.42	20.56
7/20/2020	0700	1900	3.51	16.8	13.29	23.39	20.55
	0700	1900					
7/21/2020	0630	1845	3.46	37.6	34.14	23.4	20.55
	0630	1845					
7/22/2020	0700	1600	7.9	11.9	4	23.38	20.61
	0630	1700					
7/23/2020	0630	1630	4.72	11.9	7.18	23.38	20.63
	0630	1630					
7/24/2020	0645	1800	3.07	8.92	5.85	23.36	20.45
	0645	1900					
7/25/2020	0715	2030	4.43	19.2	14.77	23.31	20.10
	0715	2030					
7/26/2020	0715	1915	3.52	18.5	14.98	23.29	19.84
	0715	2000					
7/27/2020	0715	1930	3.99	16.1	12.11	23.27	19.77
	0730	1930					