



MEMORANDUM

To: Daniel Krenz, US Army Corps of Engineers **Date:** January 17, 2019

From: Calvin Taylor, Environmental Services Department (ESD), City of Tacoma
Shauna Hansen, ESD, City of Tacoma **Project:** Leach Creek Holding Basin (LCHB) Maintenance Project

Cc: Char Naylor, Puyallup Tribe of Indians (PTI)
Russ Ladley, PTI
John Burk, ESD, City of Tacoma
Steve Hoffman, ESD, City of Tacoma

Re: Supplemental Alternatives Information

Dear Dan:

We are writing to provide the additional alternatives analysis requested by the Puyallup Tribe of Indians in their May 4, 2018 letter to the United States Army Corp of Engineers (USACE) to consider alternatives to pumping stormwater from Chambers-Clover Creek Watershed. We used the USACE alternatives analysis criteria to determine the least environmentally damaging practicable alternative (LEDPA.) Please see the attached alternatives analysis matrix and alternatives map for details on project practicability criteria including costs, logistics, and existing technology.

Project Purpose

The Leach Creek Holding Basin (LCHB) capacity as constructed in 1961 has decreased due to sedimentation and vegetation growth, while the need for stormwater capacity has increased due to surrounding development.

During storm events when LCHB capacity is exceeded, dam spillway overtopping occurs. Spillway overtopping can result in risk to public safety, flooding of downstream properties, channel erosion and the scouring of salmon habitat from high flow. Property damage caused by historic flooding downstream from the holding basin resulted in lawsuits prompting construction of the pump station to divert a portion of the stormwater runoff to the Thea Foss Waterway marine

outfalls during high flow events. Historically, the proportion of stormwater diverted by the pump station has been around 8%, with 92% released down Leach Creek.

The purpose of this project is to increase control of stormwater flow during storm events that trigger pumping as necessary to reduce flooding impacts to public safety and downstream habitat.

In addition to addressing flooding, this project will also address dam maintenance required by the Department of Ecology (Ecology) Dam Safety Office inspection and guidance manual.

The proposed permit project elements include:

- Create a stormwater channel to remove flow from the toe of the dam and create additional hydraulic connectivity between the holding basin storage areas and the stormwater pump station.
- Upgrade the holding basin outfall structure to incorporate fish exclusion design.
- Evaluate pump station operational settings for opportunities to improve efficiency.
- Provide ongoing holding basin and dam maintenance.

Natural Resource Concerns

During the course of public review, concerns were raised regarding the effect of transferring flow from the Chambers-Clover Creek Watershed, particularly the effect to summer base flow needed in Leach Creek to support coho salmon.

Summer habitat use by coho is somewhat variable, but they largely reside in cooler water with overhead cover. In smaller streams this includes areas of current between 2-8 inches deep, whereas in larger streams they prefer pools greater than 3 feet deep (Wydoski and Whitney, 2003). Preferred water velocities are 0.3-1.5 feet/second (Moyle, 2002).

We have reviewed stream data provided by the nearest USGS stream gage (# 12091200) located near the Emerson Street crossing approximately 1,350 feet downstream from the LCHB outlet. The mean daily discharge for July through September at this location is 2.7 cfs (0.7 feet /second) with a gage height of 0.9ft (10.8 inches) for 20 years of record for this location. Daily base flows are evident throughout the summer season. Based on this record, summer base flows within the existing stream channel below the LCHB are adequate to support coho salmon use.

Additional Alternatives Considered

Project design and permitting started with initial investigations in 2002 to assess design solutions to address flooding. Initial alternatives considered at that time were variations of clearing and grading within the LCHB to increase storage capacity (Jones and Stokes, 2003). In 2011, alternatives were analyzed with hydraulic modeling to evaluate adjustments to the pump settings (Brown and Caldwell, 2011). In 2016 another alternatives analysis was prepared to assess wetland clearing impacts and different channel configurations (Grette Associates, 2016).

This technical memo presents four additional alternatives to compare to the proposed maintenance project (Alternative 1) and a “no action” alternative (Alternative 2). These four

alternatives consider options for reducing or eliminating stormwater pumping from the holding basin in the Chambers-Clover Creek Watershed to Thea Foss Waterway Watershed marine outfalls.

Alternative Practicability and Environmental Impact Analysis

Alternative 1 – Project as Designed

This alternative consists of re-routing the stormwater flow path within LCHB to protect the dam, improve hydraulic connectivity between pump station forebay and the rest of the holding basin, and improve the outlet structure. Alternative 1 is considered practicable based on the engineering design scope and budget. A wetland impact analysis and mitigation plan was provided. Hydraulic modeling showed the potential for reduction in downstream flooding based on the proposed design.

Alternative 1 is the least environmentally damaging practicable alternative.

Alternative 2 – Dam Protection

This alternative consists of placing ecology blocks along the toe of the dam within the holding basin to move an existing flow channel away from the dam to protect it from potential erosion and dam failure. This action would not require a permit. It would meet the project need to protect the dam per guidance from the Ecology Dam Safety Office. However, this alternative would not improve hydraulic connectivity to the pump station or reduce downstream flooding.

For the purpose of the alternatives comparison, we assumed Alternative 2 would be implemented as part of Alternatives 3 through 6 to address dam safety in each case. Alternative 2 will be implemented on its own in the event that another alternative cannot be permitted.

Alternative 3 - Downstream Leach Creek Restoration

This alternative consists of purchase and removal of houses located in Fircrest and restoration of the Leach Creek reach within the area where the houses were located.

Based on historical flooding information, at least 34 houses would have to be demolished from the flood prone area to restore the creek reach. Although this alternative would stop flooding the historically flooded properties, further modeling and analysis would be required to confirm whether it would help alleviate flooding further downstream.

Alternative 3 is not a practicable alternative due to high property acquisition and creek restoration costs, and long timeline associated with uncertainty of property acquisitions.

Alternative 4 - Building Upstream Green Stormwater Infrastructure (GSI)

This alternative consists of maximizing permeable pavement construction in the Leach Creek Watershed upstream from LCHB. The objective is to reduce stormwater runoff to Leach Creek

by disconnecting it from the regional stormwater system via infiltration to the underlying sediments. Infiltration would also help recharge groundwater in the area. Constructing permeable pavement in the Leach Creek Watershed is part of the City’s overall stormwater management approach, but it will not meet the needs of this project for the following reasons:

- Leach Creek watershed is underlain by low permeability glacial till.
- Permeable pavement infiltration capacity is orders of magnitude less than the amount of runoff generated by a large storm event.
- The 84 acres of residential streets available to convert to permeable pavement for stormwater infiltration will not be sufficient to manage stormwater runoff from storms that initiate holding basin pumping.

Based on these observations, Alternative 4 would not be able to achieve significant reduction in downstream flooding. Current GSI methods and technology cannot provide enough infiltration capacity to manage runoff upstream in the Leach Creek Watershed based on the limited infiltration capacity of the glacial sediments mapped (USGS) in this area of the City.

Alternative 4 is not a practicable alternative due to high cost and technical infeasibility.

Alternative 5 - Stream Channel Relocation

This alternative consists of building a new overflow outfall structure in the southeast corner of the holding basin and directing excess stormwater to a new overflow stream channel constructed to the east of current residences in an undeveloped wetland area adjacent to Orchard Street. The new overflow creek channel would join with the existing Leach Creek channel south of Emerson Street. Project elements would include:

Project Element	Impact/Design Considerations
Excavate up to 4.0 acres of wetland area within the basin to redirect the flow to the new outfall in the southeast corner.	Greater wetland loss within the holding basin than the proposed Alternative 1 which requires 0.03 acres of permanent impact and 1.02 acres of wetland conversion.
Construct a new creek channel through the forested wetland areas (Category 1 or 2) adjacent to Orchard Street. Also, construct new channel through two wetland areas south of Emerson Street.	Excavation of 3.5 acres of wetland area, to provide adequate area for wide, shallow streambanks for engineered channel.
Construct 15-foot access road along the length of the new channel to allow for ongoing maintenance of channel.	Included in 3.5 acres of wetland impact area, to provide adequate access for maintenance.
Hard structural streambanks in new channel to prevent stream cutting into the downslope bank and erosion of the upslope due to subsurface seeps.	Hard structural streambanks would inhibit the establishment of riparian vegetation.
City does not own property along the new channel alignment.	Acquisition costs for multiple properties.

Construct culverts under Emerson and private access road, at depths up to 25 feet below road grade.	Construction costs and traffic impacts at roadway crossings.
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Wetland Mitigation Considerations

The cost estimate for Alternative 5 includes wetland mitigation through purchase of Pierce County In Lieu Fund (PCILF) credits. The credit-debit method scores the mitigation obligation (debit) or value (credit) through factors associated with wetland functions, water quality improvement, hydrology and habitat. The forested wetlands within the LCHB score 8 (water quality improvement), 9 (hydrology recharge), and 7 (habitat) respectively. To calculate the mitigation credit obligation, we multiply the impact acreage by the highest scoring function, in this case the hydrology factor of nine. For Alternative 5:

- The cut area required for the new outlet = 4.0 acres = 36 credits
- The new creek channel clearing and excavation area = 3.5 acres = 31.5 credits

The resulting total PCILF credit obligation is 67.5 credits. The price per credit for impacts in the Chambers-Clover Creek Watershed is \$40,000.00. Therefore, the mitigation cost for Alternative 5 is \$2,700,000.00.

Additional Regulatory Considerations

The project will be located in Fircrest and University Place. A SEPA and critical areas review will be required. Based on the anticipated wetland impacts, a SEPA determination of no significance is unlikely which would then require an Environmental Impact Statement.

Federal laws protecting wetlands from the proposed construction impacts of Alternative 5 include the Clean Water Act and the Endangered Species Act, among others. The Washington Department of Fish and Wildlife has jurisdiction over Waters of the State through the State Hydraulic Code.

Based on the logistical issues and wetland impacts, Alternative 5 is not a practicable alternative.

Alternative 6 - Pump Station Redirect to Neighboring Flett Creek Watershed

This alternative consists of pumping stormwater from the Leach Creek Holding Basin to the South Tacoma Channel (Flett Creek Watershed) which keeps the water within the Chambers-Clover Creek Watershed. Alternative 6 would intercept the stormwater force main at S. 36th and Madison Street and extend a stormwater conveyance pipe down to the head of the South Tacoma Channel stormwater ditch. Alternative 6 would not result in a change to the current operations of the LCHB and pump station nor address the project purpose of providing additional reduction in downstream flooding. The project cost estimate is \$2,000,000.

In addition, the City looked beyond Alternative 6 and conducted a preliminary investigation of a regional stormwater infiltration facility along the South Tacoma Channel stormwater ditch that

could receive stormwater discharge from Leach Creek Holding Basin and upstream Flett Creek drainage sub-basins. The preliminary evaluation indicated very significant logistical, technical, and financial challenges. The project cost estimate based on a range of soil infiltration rates is \$7,000,000 to \$11,000,000 dollars.

Alternative 6 Project Element	Impact/Design Considerations
Stormwater is discharged from LCHB during high intensity, high flow events which only occur every few years.	During these infrequent events, approximately 8 percent (cumulative over 5-year period) of LCHB stormwater is discharged to the South Tacoma Channel stormwater ditch (ditch).
The occasional increased discharges to the ditch could exceed the stormwater conveyance capacity in the downstream neighborhood leading to more street and property flooding, unless a significant amount of the stormwater could be infiltrated.	The South Tacoma Channel is underlain by highly permeable outwash soils that have the potential to infiltrate a significant portion of stormwater discharged to the ditch. Additional soil testing is necessary to verify infiltration potential.
The stormwater ditch is located within South Tacoma Groundwater Protection District.	The potential for stormwater infiltration to impact municipal drinking water aquifers must be evaluated. Additional study to characterize glacial outwash sediments and hydrogeology is required to assess risk.
Wetlands and wetland fringes were identified during a site investigation at several areas along the channel.	Increased flow to the stormwater ditch would not necessarily have adverse impacts to the existing wetlands. However, increased infiltration may also decrease flows to adjacent wetland areas. Critical areas permit review would be required.
The South Tacoma Fields adjacent to the channel is a listed Superfund clean-up site, under institutional orders placed through the CERCLA process by the EPA.	Record of Decision documents show that the contamination does not extend to the proposed project area.
The stormwater ditch is only partially located within City Stormwater Easements and Right-of-Way. A significant portion of the channel is located on BNSF property.	Depending on the underlying soils infiltration capacity, the existing length of channel under City control may be sufficient. The City should extend easements to cover the total stormwater channel footprint for maintenance access.
Maintenance of high flow infiltration facilities to prevent clogging and maintain design infiltration rates can be challenging.	Construction of a permanent access road will be required to maintain portions of the channel not already accessible from public roads. Large pretreatment facilities to clean up inflows from stormwater pipes to the

	ditch may be required to prevent failure of infiltration facility.
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Alternative 6 is not a practicable alternative because it does not meet the project purpose.

Conclusions

- Alternative 1 is the least environmentally damaging practicable alternative.
- Alternative 2 meets one of the project needs, but does not meet all project needs. It would be implemented to meet the requirements of the Ecology Dam Inspection Office in the event the planned project could not be permitted.
- Alternative 3 is a reasonable alternative, but not practicable due to high costs and the long and uncertain project timeline.
- Alternative 4 is infeasible because the low permeability glacial sediments in the area are not favorable to infiltrate stormwater runoff.
- Alternative 5 is not practicable because of logistical issues and environmental impacts.
- Alternative 6 does not meet the project purpose to reduce downstream flooding.

The City of Tacoma is committed to working together with the Puyallup Tribe of Indians (PTI) in watershed planning to preserve, protect, and restore our creeks, rivers, and Puget Sound. This includes engaging the PTI early in the planning and permitting phases of projects, including their input during JARPA preparation and collaborating in other watershed planning efforts.

If you require additional information or have further concerns to discuss, please contact Cal Taylor at 253.593.7711 or by email at ctaylor5@cityoftacoma.org.

REFERENCES

- Brown and Caldwell, July 2011. Hydrologic and Hydraulic Modeling and Proposed Improvements.
- Grette Associates, July 2016. City of Tacoma Public Works: Leach Creek Holding Basin Maintenance Project: Section 404(B) (1) Alternatives Analysis.
- Jones and Stokes, 2003. Permitting Constraints Analysis: Leach Creek Stormwater Facility: Maintenance and Expansion. Prepared for the City of Tacoma: Department of Public Works. Final Revision April 2003.
- Moyle, P.B., 2002. Inland Fishes of California. Berkely: University of California Press.
- Wydoski, R.S. and R.L. Whitney, 2003. Inland Fishes of Washington. University of Washington Press.