ONE TACOMA

A Comprehensive Plan for a Vibrant, Connected, and Sustainable City

Environment and Watershed Health Baseline Conditions DRAFT | November 2024

CONTENTS

EXHIBITS

1 BASELINE CONDITIONS

Before Western contact and settlement, the Puyallup people lived in villages from the foothills of təqʷuʔməʔ (Mount Tahoma), residing along the rivers that lead to Commencement Bay and into the South Puget Sound. The Puyallup Tribe, an independent sovereign nation, is the original steward of the land where Tacoma sits today, tending to the land where plants and animals were abundant and nurturing the waters where salmon, shellfish, and other marine resources were cultivated and harvested. Over time, however, the colonization, development, and industrialization of Tacoma have significantly worsened day-to-day life support systems, marginalized indigenous peoples, and resulted in extreme short-term gains for some at great cost to others, including plants and animals.

Tacoma's history of logging and a lack of environmentally conscious City policies have contributed to an underdeveloped tree canopy. Some industries and transportation have polluted and continue to pollute air, soils, and waters, affecting culturally and economically important species and public health. Wood smoke pollution in the winter months impacted not only Tacoma but the greater Pierce County area. While the City has made some progress in addressing pollution, like the facilitated widespread wood stove change-outs that occurred almost a decade ago, other forms of pollution have worsened.

Tacoma’s natural resources provide an array of ecologically, economically, and culturally valuable ecosystem services. The river, streams, aquifers, and floodplains convey and store water and provide critical habitat for native fish and aquatic species. The deep waters of Thea Foss waterway support international trade and commerce. Many of these resources also trap carbon and reduce the effects of urban heat islands. Today, greenhouse gas (GHG) pollution threatens the well-being of Tacoma’s interdependent web of life for generations. Climate-warming gases are causing and worsening natural disasters. However, the City acknowledges these facts and is pursuing action to address climate issues through meaningful and intentional action and stewardship. Indigenous communities and other Black, Indigenous, and people of color (BIPOC) groups are valued role models and collaborators in this process to improve stewardship and overall community wellbeing. In December 2019, the Tacoma City Council, in coordination with the Puyallup Tribal Council, declared a climate emergency as a means to commit to protecting environmental assets and local communities. The resolution emphasized goals related to reducing GHG emissions, preparing for and mitigating climate impacts, and initiating a departure from fossil fuel reliance.

Exhibit 1: Tacoma Environmental Assets and Hazards Map.

Sources: City of Tacoma (*Streams, Wetlands, and Waterways; Aquifer Recharge Areas; Open Space Corridors; Landslides and Erosion Hazards; Flood Hazard Areas; Liquefaction Susceptibility*) 2024; Washington Department of Fish and Wildlife (*Biodiversity Areas and Wetlands*), 2024; Seva Workshop, 2024.

The City has committed to restoring and maintaining a high-quality environment. However, many of Tacoma's natural resources have been lost over time or are currently at risk. Development increases stormwater runoff, eroding stream channels and polluting waterways, making them unable to support healthy habitats. There is concern that anticipated growth and

development will result in substantial tree removal, continued habitat loss, and negative impacts on at-risk plant and animal species.

The City's land use plans and investments have been and will continue to be instrumental in helping guide and understand effective approaches to preserving natural resources. In addition, the City has invested time and money to restore Tacoma's watersheds. With thoughtful guidance, the community can work together to face new challenges and achieve and sustain healthy watersheds and a healthful environment for all Tacomans as the city grows.

1.1 Climate Change

Climate change is significantly impacting the Puget Sound region, resulting in extreme heat waves, increased year-round temperatures, diminished snowpack, rising sea levels, wildfire and smoke, and flooding from extreme precipitation and storm surges. Potential climate impacts to Tacoma's community include:

Social & Health impacts:

- Displacement of communities due to sea level rise flooding (as seen in Exhibit 1 and Exhibit 3)
  - Communities and businesses located in the West End, North End, and Tideflats are at higher risk of displacement due to flooding than inland communities.[1]
- Public health risks from wildfire smoke and heat
- Water-borne illnesses
  - Diseases such as salmonella and other bacterial and parasitic pathogens can have increased survival and growth due to increased air and water temperatures. E. coli and fecal pathogens can experience increased mobilization and dispersion due to flooding, drought, or storm surge and sea level rise.[2]

Natural System impacts:

- Stream pollutants
- Less shade and carbon storage from vegetation loss
- Marine habitat degradation

[1] Tacoma Climate Change Resilience Study, Executive Summary, May 2016

[2] Waterborne Diseases That Are Sensitive to Climate Variability and Climate Change, The New England Journal of Medicine, https://www.nejm.org/doi/full/10.1056/NEJMra2300794

Infrastructure impacts:

- Transportation shutdowns due to the flooding and inundation of roadways, rail lines, and ports[3]
- Strained energy supply
- Flooding of low-lying infrastructure, such as buildings, roads, and other essential structures

Economic impacts:

- Mobility (people and goods) impacted by flooding
- Damage to critical infrastructure due to sea level rise
- Property value losses
- Risks to resource losses in agriculture, forestry, food
- Business operations affected by flooding

The effects of these impacts can be far-reaching and often disproportionately impact vulnerable communities. Impacts could potentially be intense for our unhoused neighbors, outdoor workers, kids, seniors, pregnant people, low-income households, BIPOC community members, people with breathing or heart issues, as well as other species, like salmon and orcas.

The cost of climate impacts, which includes the loss of human life, reduction in quality of life, disruption of critical services, and loss of economic assets from natural hazards and extreme events under future climate change conditions, is projected to reach $3 billion by 2050 and over $250 million by 2080.[4] Although reducing emissions may appear costly, the resulting economic growth and benefits for Tacoma's ecosystems and human well-being will enable the community to prosper in the future.

While Tacoma is actively working to reduce GHG emissions, some climate effects are already irreversible, and the city will face these challenges for years to come. The City of Tacoma is dedicated to fostering a climate-resilient future, building on its established history of climate action. Key initiatives include the Tacoma Community Climate Action Plan (2008) the Tacoma Environmental Action Plan (2016), the Tacoma Climate Adaptation Strategy (2021) and the 2030 Tacoma Climate Plan (2021).

During the Environmental Action Plan (EAP) from 2016 to 2020, many actions were taken to help address climate concerns and future impacts. For example, the City and Pierce County have added 20 percent more community gardens in low-income, at-risk communities, developed and shared educational resources related to waste prevention and electric vehicles, and planted 4,500 trees in Tacoma's hottest neighborhoods.[5] However, the EAP goals and investments were not aggressive enough to feasibly attain a net-zero emissions future. Thus, in 2021, the City formed a more aggressive approach in the Tacoma Climate Action Plan, which committed

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[3] United Nations Environment Programme (2024). Climate Risks in the Transportation Sector. Geneva, https://www.unepfi.org/wordpress/wp-content/uploads/2024/05/Climate-Risks-in-the-Transportation-Sector.pdf

[4] Source: 2030 Tacoma Climate Action Plan, 2021; Tacoma Climate Adaptation Strategy, 2021

[5] City of Tacoma, 2030 Tacoma Climate Action Plan, 2021

Tacoma to a 2050 net-zero emissions goal. This goal aligns with targets set by many other communities across the U.S. and the global target needed to increase the chances of avoiding catastrophic climate change. The Tacoma Climate Action Plan describes the steps that the City will take to reach its net-zero emissions goal, including strategies, actions, and targets to measure progress toward this goal.[6] According to Tacoma's 2019 GHG emissions inventory, the city's GHG pollution amounted to approximately 1.7 million metric tons of carbon dioxide equivalent emissions (MtCO2e) or 7.8 MtCO2e per person. To reach net zero, the city would need to reduce its emissions by 33 percent by 2030.

To ensure transparency and accountability, the City of Tacoma develops an annual progress report that tracks 2030 Indicator Targets. These indicators are often easier to relate to than measurements of tons of GHG pollution, are trackable, and usually show more immediate community impact. The metrics include things like the number of trees planted in neighborhoods, public electric vehicle charging stations installed, and miles of sidewalks built or repaired. Actions are categorized by the following strategy categories:

- Better Together (community welfare and collaboration)
- Better Living (improving the general quality of life)
- Better Breathing (air quality)
- Better Resource Use (related to consumption, waste prevention, and reuse)
- Better Opportunities (economic health)
- Better Prepared (resiliency)

The actions found in the above categories were determined to be high impact as they would either contribute to a significant reduction in GHG emissions, center historically underserved communities in development and implementation, or deliver substantial co-benefits that contribute to an enhanced quality of life.

The 2023 progress report indicated that the City has made strides towards achieving 2030 goals. According to the report, since 2022, the City:

- Increased community-led climate equity projects and programs by almost 72 percent
- Added 19 additional community food projects (including gardens, food forests, orchards, farms, food rescue efforts, and farmers markets)
- Increased miles of sidewalks (14 percent) and bicycle infrastructure (80 percent)
- Increased the number of green certified commercial buildings (2 percent) and housing units (10 percent), preserved housing units (7 percent), and new affordable units (13 percent)

[6] Ibid., page 2

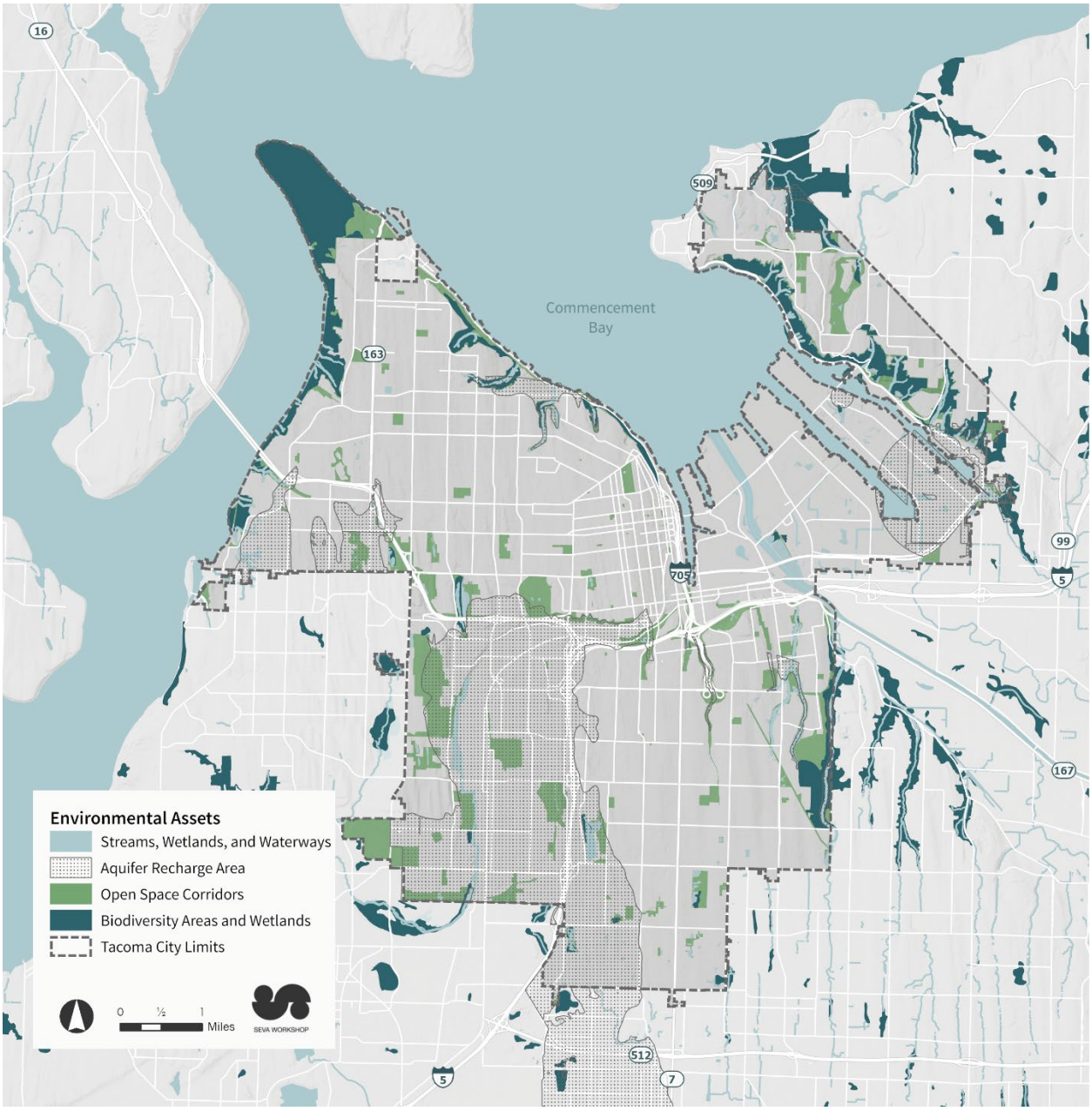
- Increased acres of actively managed open space habitats (21 percent) and protected open space ecosystem habitats (53 percent)
- Increased natural heat island intervention projects (68 percent)
- Reduced GHG from municipal fleet by 36 percent

1.2 Environmental Assets and Hazards

Tacoma's natural resources include the marine ecosystems of the Puget Sound, the Puyallup River and its tributaries, urban wetlands, open spaces, parks, and urban forests. Together, these resources play an important role in stormwater management, air and water purification, habitat for diverse fish and wildlife species, and climate change mitigation and adaptation.

Tacoma also faces a variety of environmental hazards that pose risks to both its natural and built environment. Across the city, there are areas at risk of landslides, erosion, flooding, and liquefaction. Development and increasing extreme weather events due to climate change can place stressors on the environment that can create vulnerabilities. Areas at risk of landslides, erosion, flooding, and liquefaction are vulnerable to potential property damage and disruption in services. As Tacoma continues to grow and face environmental challenges, thoughtful and proactive management of the city's environmental assets and hazards will be important to ensure communities are thriving and resilient.

Exhibit 2: Tacoma Environmental Assets Map.



Sources: City of Tacoma (*Streams, Wetlands, and Waterways; Aquifer Recharge Areas; Open Space Corridors*) 2024; Washington Department of Fish and Wildlife (*Biodiversity Areas and Wetlands*), 2024; Seva Workshop, 2024.

Exhibit 3: Tacoma Environmental Hazards Map.

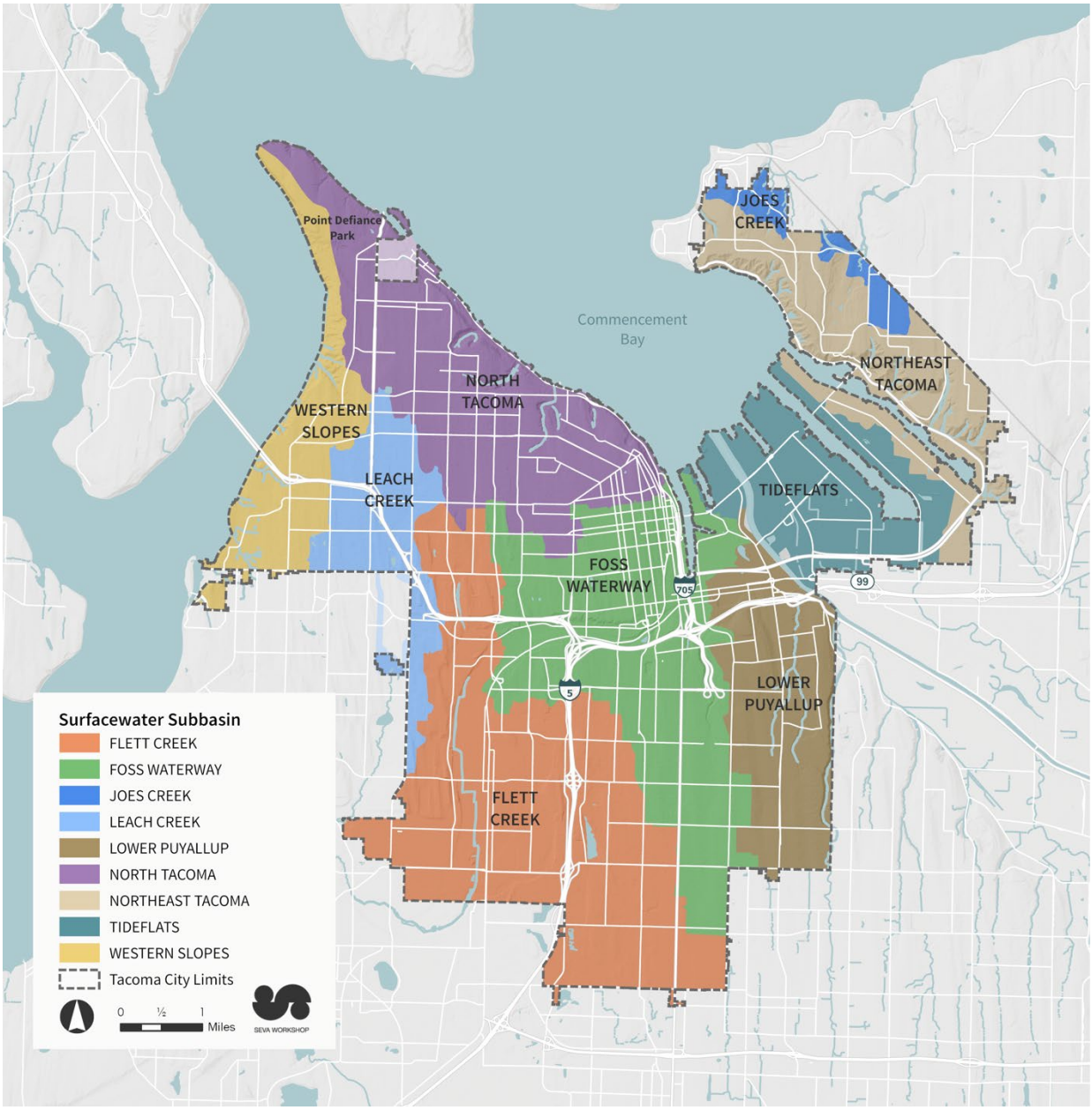
Sources: City of Tacoma (*Landslides and Erosion Hazards; Flood Hazard Areas; Liquefaction Susceptibility*) 2024; Seva Workshop, 2024.

1.3 Watersheds[7]

The nine watersheds located in Tacoma are described below and mapped in Exhibit 4: Flett Creek, Foss Waterway, Joe's Creek, Leach Creek, Lower Puyallup, North Tacoma, Northeast Tacoma, Tideflats, and Western Slopes. The watersheds in Tacoma are also a part of Washington State's Water Resource Inventory Area (WRIA). Roughly half of the watersheds are either part of WRIA-10 Puyallup-White Watershed or WRIA-12 Chambers-Clover Creek Watershed.

[7] Section 1.3 Watershed is informed by the City of Tacoma's Urban Watershed Protection Plan. Description of waterbodies and facilities as well as any charts or tables included in this section originates from the Urban Watershed Protection Plan.

Exhibit 4: Tacoma Watersheds Map.



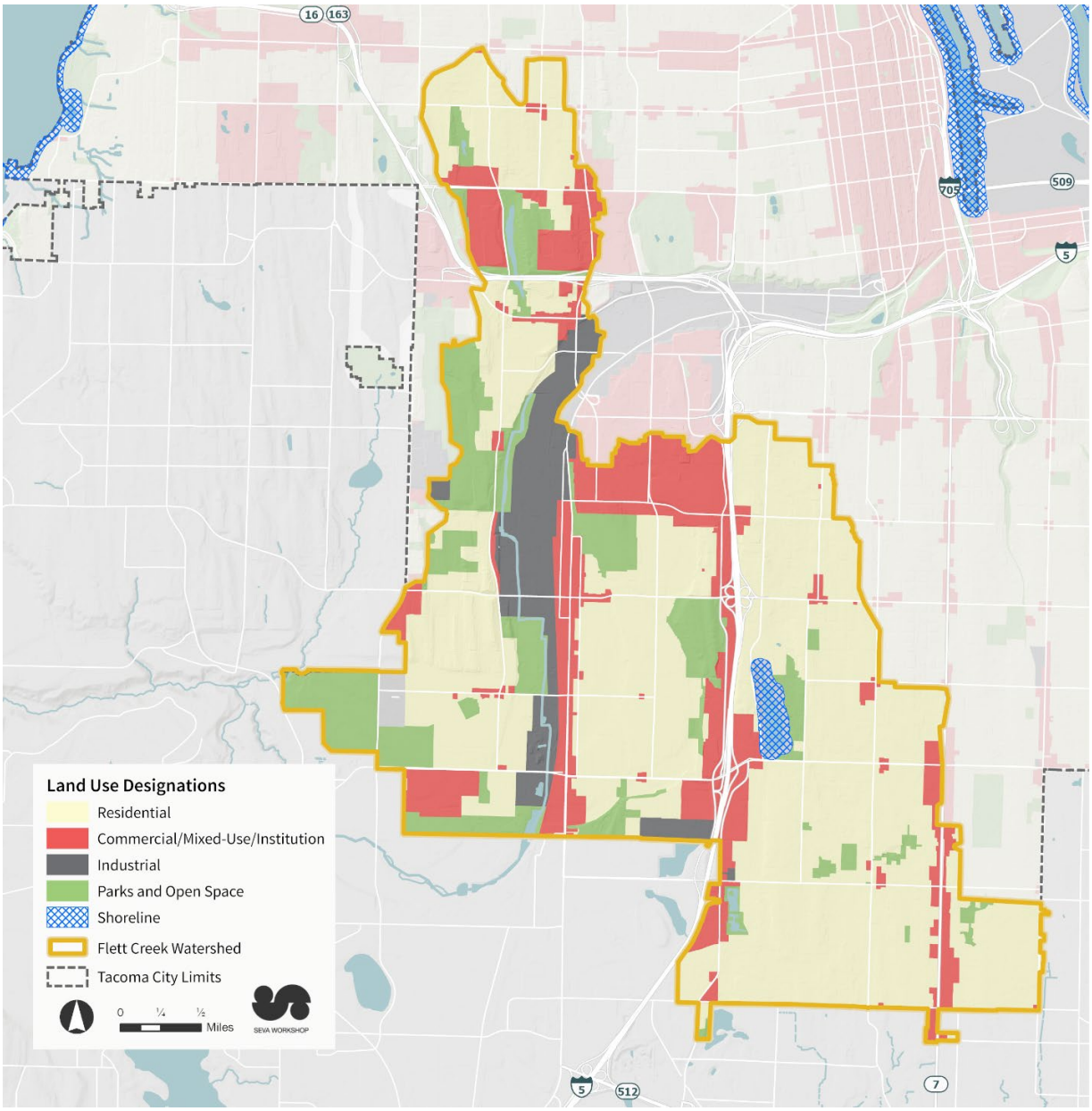
Sources: City of Tacoma, 2024, Seva Workshop, 2024.

The maps in Exhibit 5 through Exhibit 32 zoom into each of Tacoma's nine watersheds and identify land use designations; known environmental assets including wetlands, streams, open space corridors, aquifer recharge areas, shorelines, fish and wildlife habitat conservation areas, and potential restoration sites; and environmental hazards including geologically hazardous areas, and flood hazard areas.

Flett Creek

The Flett Creek Watershed is approximately 7,930 acres with 7,130 acres within the City of Tacoma limits and is the largest watershed in the city. The Flett Creek watershed is one of two watersheds in Tacoma that do not contain saltwater shorelines. The watershed is predominately residential with commercial and light industrial uses in localized areas as illustrated in Exhibit 5. The watershed is 43 percent impervious.

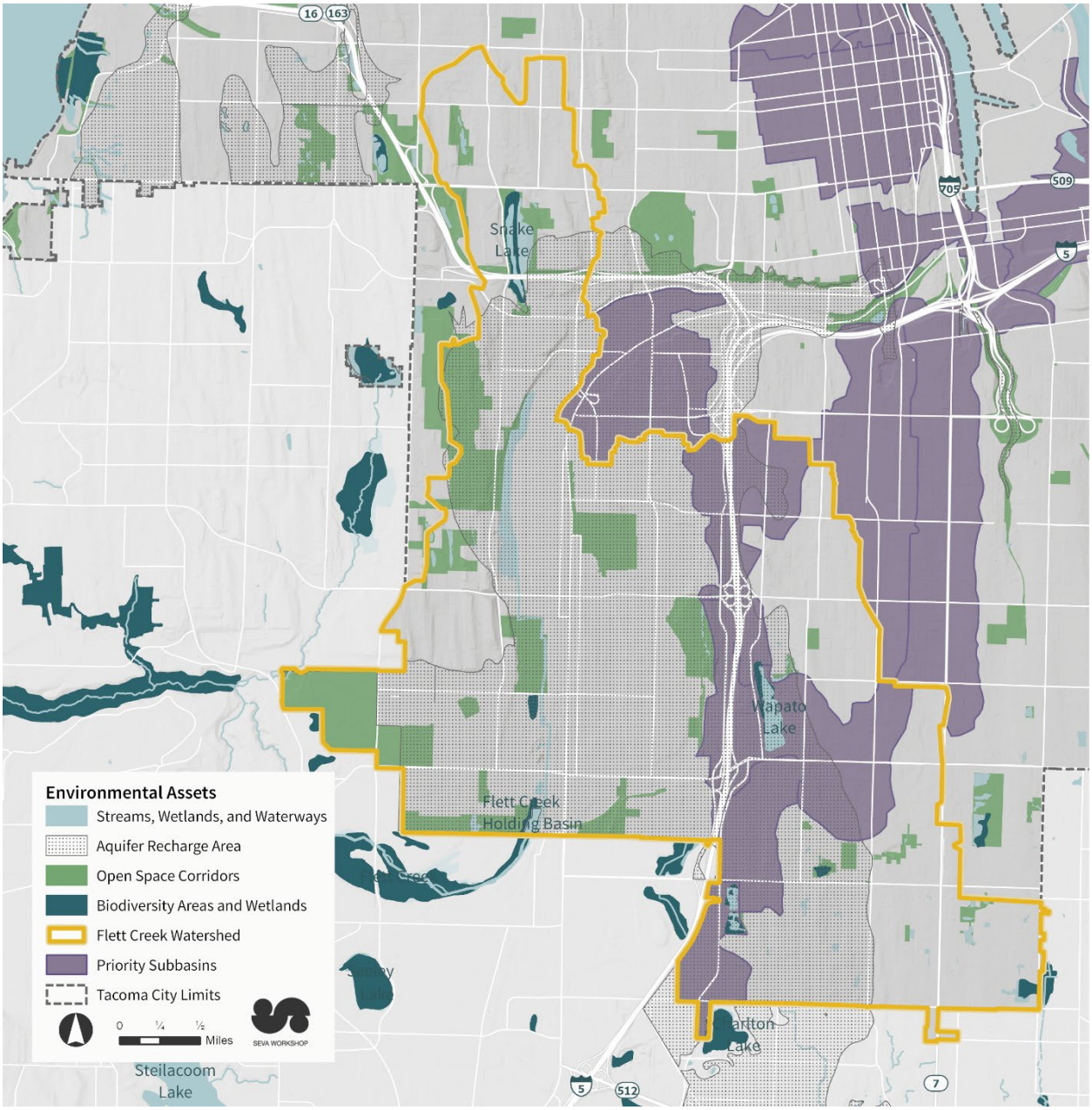
Exhibit 5: Land Use Designations within Flett Creek Watershed.



Sources: City of Tacoma (*Future Land Use Designation*), 2024; Seva Workshop, 2024

Flett Creek itself occurs within the City of Lakewood and flows into Chambers Creek, but the historic headwaters of the creek are located in Tacoma. Flett Creek Watershed is bordered by the Thea Foss Watershed to the east, Leach Creek Watershed on the west, and Pierce County to the south. Flett Creek Watershed is also part of WRIA-12 Chambers-Clover Creek Watershed.

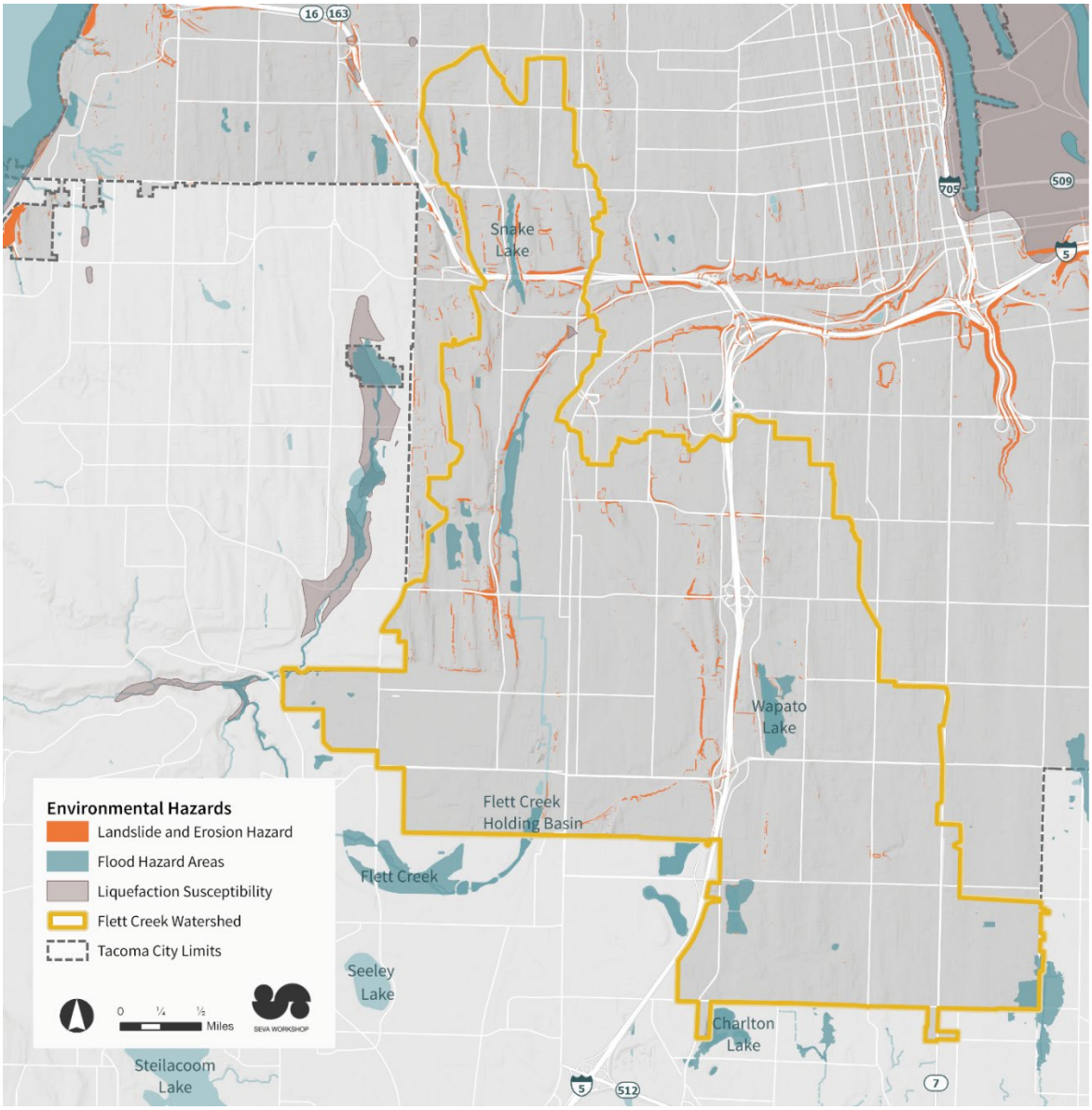
Exhibit 6: Environmental Assets, Flett Creek Watershed.



Sources: City of Tacoma (*Streams, Wetlands, and Waterways; Aquifer Recharge Areas; Open Space Corridors*; *Priority Subbasins*) 2024; Washington Department of Fish and Wildlife (*Biodiversity Areas and Wetlands*), 2024; Seva Workshop, 2024.

The watershed includes Snake, Wapato and Wards Lakes, Hosmer and 84th Street Holding Basins, the Flett Creek Holding Ponds, portions of Interstate 5 and State Route 16, the South Tacoma Groundwater Protection District, and the South Tacoma Channel Superfund Site. The Delong Pond wetland, an isolated waterbody, is also located in this drainage basin. The Pierce County Conservations Futures Program purchased part of the Delong Pond wetland to be preserved as wildlife habitat and open space. All 7,930 acres of the watershed drain into the Flett Creek Holding Basins, which are pumped from a single pump station into the Flett Dairy Wetlands and Flett Creek.

Exhibit 7: Environmental Hazards, Flett Creek Watershed.



Sources: City of Tacoma (*Landslides and Erosion Hazards; Flood Hazard Areas; Liquefaction Susceptibility*) 2024; Seva Workshop, 2024.

Receiving Waterbodies and Stormwater Facilities

Snake Lake

Snake Lake is a 17-acre urban lake and wetland. The water from Snake Lake discharges to the South Tacoma Channel and, during high flow events, to the Flett Creek Holding Basins.

The lake is the central feature of the Tacoma Nature Center, a 54-acre facility dedicated to nature education and research. The facility is operated by Metro Parks Tacoma. The lake does not support fishing or swimming, but the surrounding area around Snake Lake does offer other recreational opportunities such as walking trails and wildlife viewings.

The nearby urban residential watershed (approximately 584 acres) drains into the lake. Eighty percent of the water that flows into the lake over a year comes from stormwater runoff. Large impervious areas in this drainage basin include the eastern portion of Cheney Stadium, Foss High School, and a Fred Meyer shopping center. Cheney Stadium was recently retrofitted with a pervious pavement parking lot and bioretention facilities; as a result of the retrofit, most of the stormwater now infiltrates and no longer directly discharges to the lake.

Wapato Lake

Wapato Lake is a small, shallow 23-acre urban lake that drains 900 residential and commercial acres from the north. The lake is the central feature of Wapato Park, an 80-acre facility owned by Metro Parks Tacoma. As the only recreational lake in the City, Wapato Lake is the target of intense watershed and in-lake maintenance and management. The goal of these activities is to reach and maintain a clear-water state to support fishing and boating.

Water quality in Wapato Lake is a challenge, due to its shallow nature and urban setting. While stormwater pollutants largely bypass the lake, Wapato Lake still experiences pollutants from other sources like birds and the release of phosphorus from lake sediments. The lake is listed by Washington Department of Ecology (Ecology) as a Category 5 “impaired waters” for fecal coliform bacteria. A water quality improvement plan, technically known as a total maximum daily load (TMDL) and is required by the Clean Water Act, to address the fecal coliform bacteria has not been scheduled. Wapato does have a TMDL for phosphorus and an Environmental Protection Agency’s (EPA) Category 4a TMDL.

Flett Wetland and Creek

Flett Creek is approximately 3.0 miles long and is located in the City of Lakewood. The historic headwaters of the creek were located at least partially in Tacoma but were ditched and/or piped long ago. The Flett Pump Station transfers water from the Flett Ponds to the effective headwaters of Flett Wetland and Creek. Flett creek flows to Chambers-Clover Creek which ultimately discharges to the Tacoma Narrows.

The Flett Wetlands are extremely flat and the creek channel slope is 0.06 percent for the first mile downstream of the pump station. The Flett Dairy dug and maintained this channel yearly until 1979. Post-maintenance, farm road culverts collapsed, and the creek channel filled in with

swamp smartweed, reed canary grass, and cattails. The collapsed culverts and the presence of beaver and vegetative dams caused water to backup and cross the emergency spillway leading water to re-enter the Flett Ponds in 2009 and 2011, respectively; this event caused adjacent and upstream properties to become flooded.

Invasive species dominance and blockages reduce the water quality and habitat complexity within the Flett Wetland. Summertime water temperatures can reach 80°F and the few fish present (bullhead and stickleback) become stranded and die during low water periods. Multiple projects are executed yearly in an effort to increase flow rate while enhancing fisheries habitat. Projects include removal of two roads/collapsed culverts, beaver dams, barbwire tangles and clearing of invasive reed canary grass from the creek channel. The creek is very weakly confined, the banks are planted yearly with willow in an effort to start hummock formation, eventually providing a substrate for shade producing woody plant species. While water levels remain high in the wetland, water has not passed back over the dike separating the ponds from the wetland since 2011 and cutthroat trout were observed the last two years in the channel (after lack of observed presence from 2009-2017).

Hosmer Holding Basin

The Hosmer Holding Basin was constructed in 1965 and drains approximately 2100 acres. The basin consists of two cells. The southern cell receives the majority of discharge and drains residential areas to the north, south and east of the basin. The north basin receives local discharges and largely acts as an equalization basin – or balancing reservoir.

Flett Holding Ponds

Stormwater runoff from the entire watershed ultimately flows into the Flett Creek Holding Basins, located in the City of Lakewood. In 1957, before widespread development, the Flett Creek Holding Ponds were originally called the “South Tacoma Swamp,” a natural depressed area that was the headwaters of Flett Creek. The South Tacoma Swamp spanned from South 48th Street to South 74th Street. A threaded channel within the wetland buffer ran from the South Tacoma Swamp location to Bridgeport Way. From 1903-1979, Flett Creek above Bridgeport Way was maintained as a distinct channel to support hay production and pasture for the Flett Dairy. After maintenance by Flett Dairy ended in 1979, channel flow became blocked due to overrun vegetation and beaver dams.

The current Flett Creek Holdings Ponds and pump station were constructed in 1981 to alleviate localized flooding. The Flett Creek Holding Basin system consists of four consecutive connected cells, approximately 4,500 feet in length, with associated piping, and a pump station. Water entering the Flett Creek Holding Basin is pumped to the Flett Dairy Wetlands and Flett Creek. Flett Creek converges with Chambers Creek which ultimately discharges to the Puget Sound.

The Flett Ponds have an extensive monoculture of swamp smartweed (Polygonum hydropiperoides), which impedes the ponds’ performance as active storage. The plants cover over 90 percent of two of the ponds, and approximately 50 percent of the other two pond. In addition to loss of active storage, the plants break off during fall/winter storms blocking

transmission pipes between the ponds and intake screens of the pump station. Herbicide applications are scheduled to assist with managing the growth of the monoculture.

Wards Lake

Wards Lake is a single cell basin which receives water from the Hosmer Holding Basin, WSDOT right-of-way, and Wapato Lake. Water entering Wards Lake from the Wapato and Hosmer outfalls is impacted by an expanding sediment delta, which is 60 percent of the outfall pipe(s) height. The delta forms the eastern edge of Owens Marsh, which deepens to become Wards Lake at the far western end of the property. The marsh will continue to fill in as a result of natural succession. The City of Tacoma is looking at multiple flood control options to address this impediment within the Hosmer-Wards-80th Street Holding Basin system. Water exits Wards Lake to the north through a pair of gates, one designed for normal flow conditions and one designed as an emergency overflow.

80th Street Holding Basin (Gravel Pit)

The 80th Street Holding Basin (formerly known as the Gravel Pit Holding Basin) was originally an open pit gravel extraction facility during the 1950s. When gravel mining ceased in 1959, the City began using the gravel pit as a regional stormwater detention facility. The Gravel Pit is a single cell holding basin, which receives water from the Wards Lake Holding Basin and a small portion of water from the City of Lakewood. The City expanded the holding capacity of the existing Gravel Pit Holding Basin in 2016. The expansion was enrolled in the Payment In-Lieu-of Construction Program, which allows the City to accelerate environmental improvements in the Flett Creek Watershed and to Flett Creek. New development and redevelopment projects within the Flett Creek Watershed have the option of participating in the Payment In-Lieu-Of Construction Program by paying a system development charge instead of constructing individual site-specific flow control facilities.

South Tacoma Channel Superfund Site

The South Tacoma Channel Superfund site is located between South Tacoma Way and Tyler Street and extends between South 56th and South 38th Streets. The western edge of the site contains a long, linear channel extending from South 38th Street to South 50th Street. The channel is not entirely under City management, but it serves an critical role in detaining and infiltrating flood flows, without damaging nearby structures. The South Tacoma Channel Superfund site has recently been delisted but continues to be subject to deed restrictions.

ESA-Listed Fish Species Critical Habit

The Flett Creek and Chambers Creek are the only waterbodies connected to the Flett Creek Watershed that have confirmed fish populations. Neither Flett Creek nor Chambers Creek are considered Critical Habitat for Puget Sound Chinook or Puget Sound Steelhead. However, based on the Washington Department of Fish and Wildlife's (WDFW) WRIA, South Sound

Tributaries Winter Steelhead, which can be found in the WRIA-12 Chambers-Clover Creek Watershed, are considered threatened species.

Salmonid spawning habitat can be found from Chambers Creek up to Bridgeport Way and there is one fish hatchery located on Chambers Creek. The following table lists the populations of fish present in both Flett Creek and Chambers Creek.

Exhibit 8: Fish Populations in Flett Creek Watershed.

Location	Fish Population
Flett Creek	Coho, documented spawning
	Summer/Fall/Winter Chum, presence
	Winter Steelhead, presumed presence
	Fall Chinook, presumed presence
Chambers Creek	Coho, documented spawning
	Summer/Fall/Winter Chum, presence
	Fall Chinook, potential presence
	Winter Steelhead, presence
	Kokanee, presence

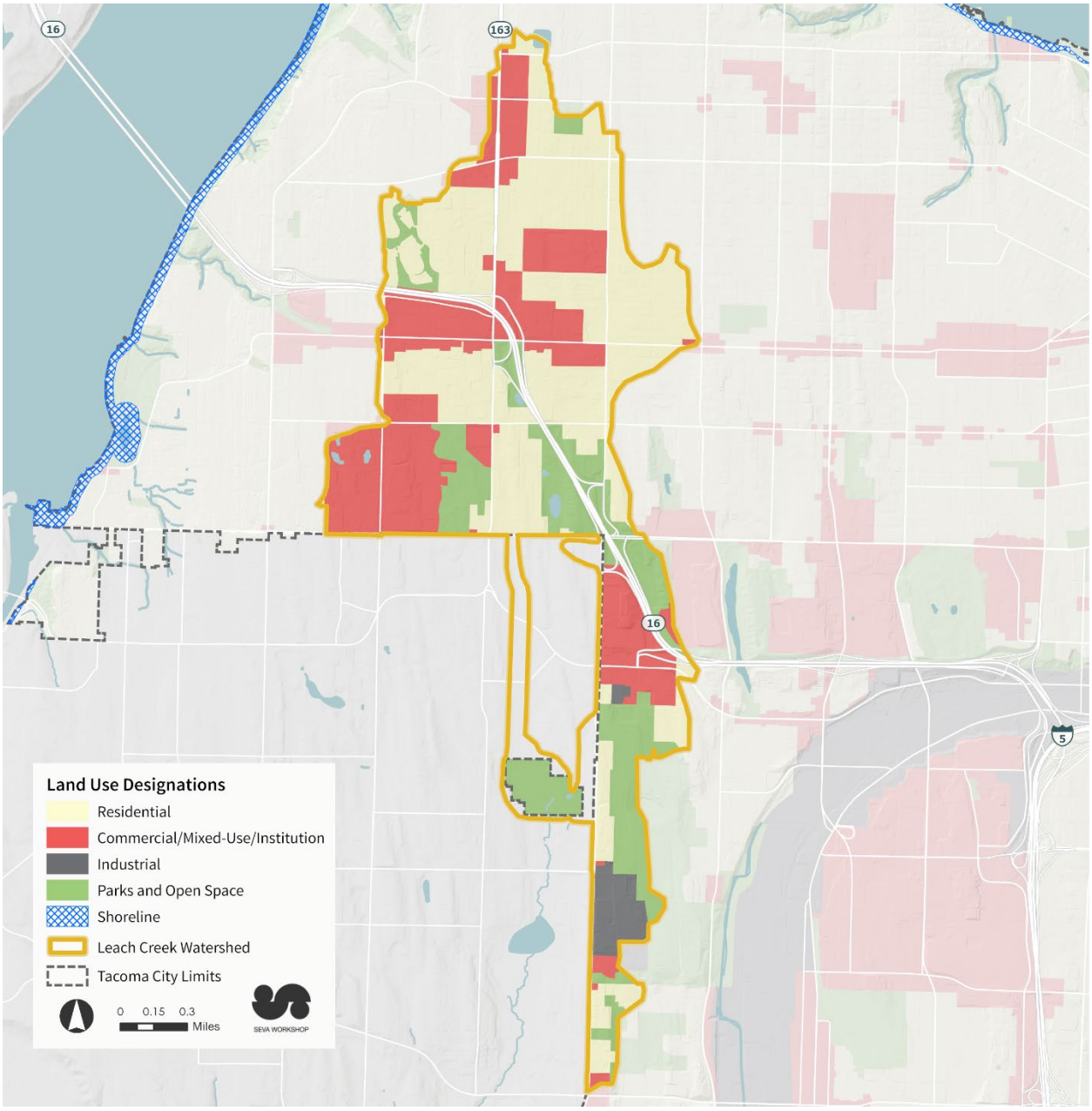
Source: City of Tacoma, 2024

Leach Creek

The Leach Creek Watershed within the City boundaries cover 1,728 acres. It is located in the west-central section of Tacoma and is bordered by the Western Slopes and North Tacoma Watersheds to the north, the Flett Creek Watershed to the east, and the Cities of Fircrest and University Place to the southwest. Like the Flett Creek Watershed, this watershed does not contain any saltwater shorelines. Leach Creek Watershed is also part of the WRIA-12 Chambers-Clover Creek Watershed.

Leach Creek has a drainage area of approximately 1,867 acres or 6.5 square miles. Exhibit 9 shows that much of the land use within Leach Creek Watershed is residential and commercial. A portion of the Tacoma Landfill Superfund site is also included in this watershed. China Lake and a system of 16 wetlands on the Tacoma Community College campus are the significant waterbodies in this watershed within City limits.

Exhibit 9: Land Use Designation within Leach Creek Watershed.



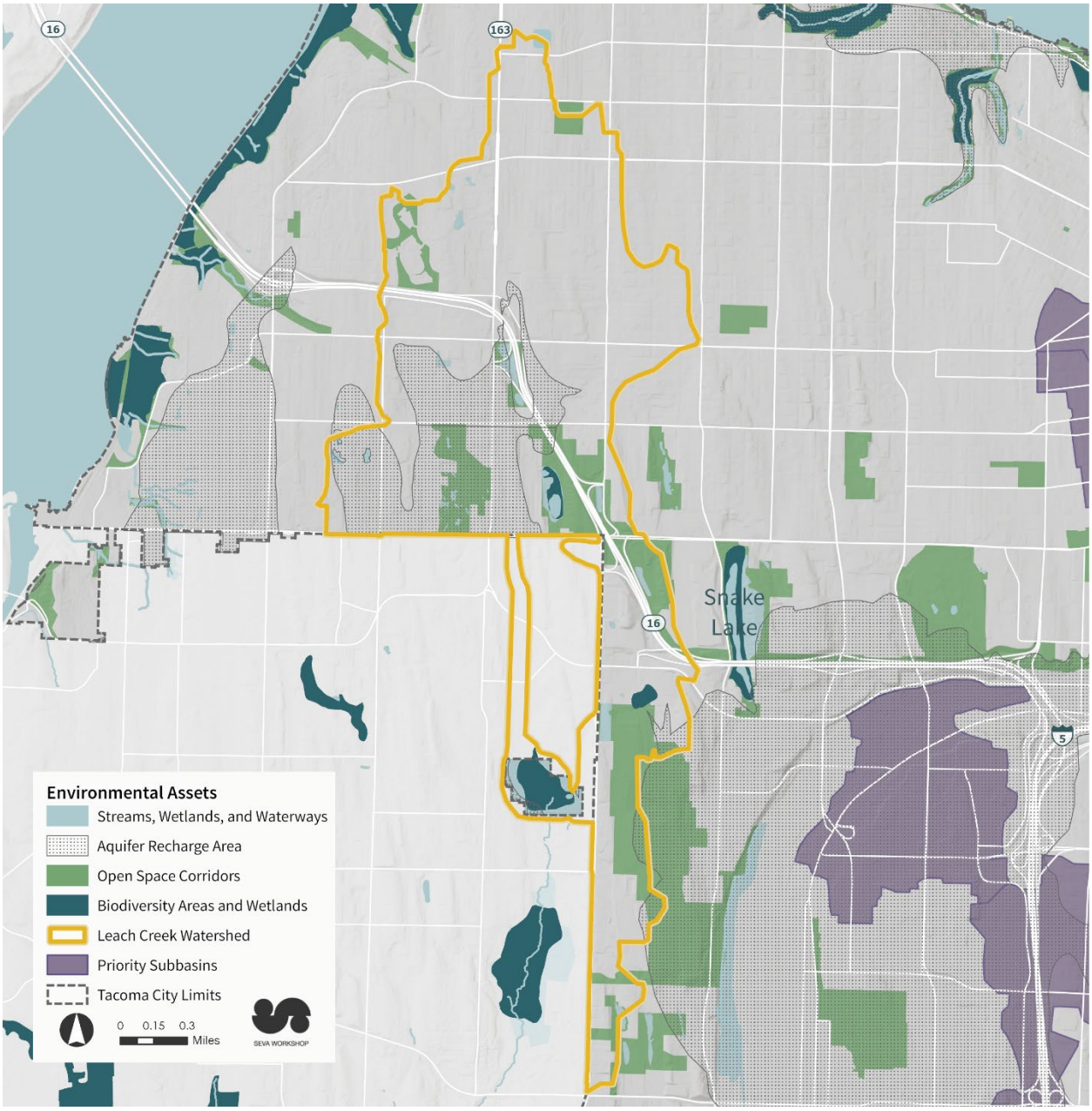
Sources: City of Tacoma (*Future Land Use Designation*), 2024; Seva Workshop, 2024

Ecology detected several instances of elevated bacteria and mercury concentrations at the mouth of Leach Creek during routine water quality monitoring in 2007-2008. Total mercury levels exceeded (did not meet) the Washington State chronic water quality criterion during four sampling events. Dissolved copper levels also exceeded the chronic criterion during two sampling events. Sources appear to lie towards the upstream end of the Leach Creek watershed. In March 2015, Ecology proposed that Leach Creek, from the holding basin to the

confluence with Chambers Creek, be placed in Category 5 on the 303(d) list of the State Water Quality Assessment as being water quality limited for mercury, copper, and bacteria based on the 2007-2008 and the 2009-2010 sampling data.

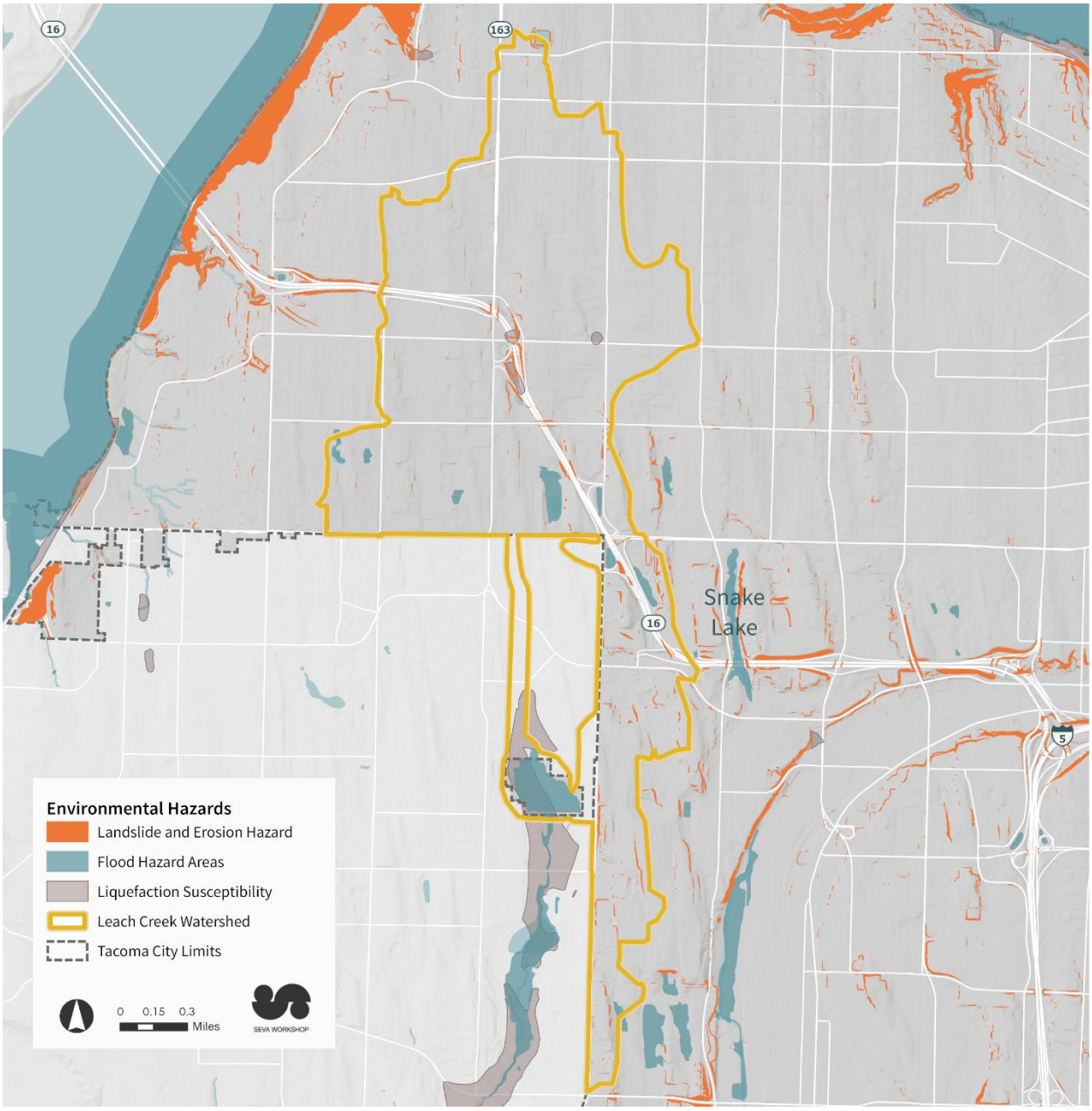
Offsite groundwater extraction wells were installed along Leach Creek to intercept and monitor any contaminants that may be traveling through the groundwater from the unlined portions of the Tacoma Transfer and Recovery Center, a Superfund site. Currently, groundwater at this location is no longer being re-directed to the wastewater treatment plant. The monitoring well data indicated that groundwater elevations have returned to pre-remediation elevations, and groundwater contaminants monitoring analytical results were meeting Consent Decree groundwater performance standards. Consequently, EPA approved decommissioning selected offsite groundwater extraction wells in 2010, with the last offsite extraction well decommissioned in March 2018.

Exhibit 10: Environmental Assets, Leach Creek Watershed.



Sources: City of Tacoma (*Streams, Wetlands, and Waterways; Aquifer Recharge Areas; Open Space Corridors; Priority Subbasins*) 2024; Washington Department of Fish and Wildlife (*Biodiversity Areas and Wetlands*), 2024; Seva Workshop, 2024.

Exhibit 11: Environmental Hazards, Leach Creek Watershed.



Sources: City of Tacoma (*Landslides and Erosion Hazards; Flood Hazard Areas; Liquefaction Susceptibility*) 2024; Seva Workshop, 2024.

Receiving Waterbodies and Stormwater Facilities

Leach Creek Holding Basin

The Leach Creek Holding Basin covers approximately 42 acres and contains 32 acres of wetlands. The holding basin collects 2,500 acres of the WRIA-12 Chambers-Clover Creek Watershed. In 1961, the holding basin was built by the City of Tacoma to control stormwater runoff into Leach Creek and help prevent downstream property flooding and stream scouring. A 1,100-foot earthen dam was constructed across a naturally depressed swampy area below Fircrest where natural springs made up the headwaters of Leach Creek. A lawsuit in the mid-1980's resulted in the construction of a pump station that would relieve downstream flooding by pumping water from the holding basin to the Thea Foss Waterway during high flow events. An open channel emergency spillway was also added to prevent dam breaching.

The holding basin has a normal operating storage capacity of approximately 80 acre-feet. During extreme storms (3.5 inches or more in 24 hours), the pond level will continue to increase and may discharge over the emergency spillway to Leach Creek. Depth over the emergency spillway may range from 6 to 12 inches, which leaves one foot of freeboard on the dam. The total emergency storage is approximately 120 acre-feet to top of dam.

Over the years, the capacity of the holding basin has decreased due to sedimentation and vegetation growth. However, the need for stormwater storage capacity within the Leach Creek Watershed has increased as the area has continued to develop. A holding basin maintenance project to increase capacity and hydraulic connectivity from the pump station to the outlet is planned for construction in 2024.

Chambers Creek System

Chambers-Clover Creek Watershed is designated as Water Resource Inventory Area 12 (WRIA 12) by the State of Washington and includes the following major water bodies: Steilacoom Lake, Leach Creek, Flett Creek, Clover Creek and Chambers Creek. Clover Creek discharges into Steilacoom Lake while Chambers Creek flows from Steilacoom Lake northward to the confluences with Flett and Leach Creeks. Turning westward, Chambers Creek then flows rapidly through steep wooded ravines to a short estuary and out to Puget Sound. Chambers Creek is a fish-bearing creek, and there are two fish hatcheries located on Chambers Creek.

Leach Creek

Leach Creek is a little over 2 miles long. Before construction of the Leach Creek Holding Basin, Leach Creek flowed through a flat marshy valley land. Presently, Leach Creek proper begins south of the holding basin dam. After passing through residential areas, Leach Creek passes through a wetland, to steep-sided and heavily wooded ravines, and finally joins Chambers Creek, just downstream of the confluence of Flett and Chambers Creek.

The upper portions of Leach Creek also have pockets of spawning grounds; however, the elimination of vegetation, channelization by streamside homeowners, and erosion during storm events has impacted these areas.

China Lake

China Lake was formed by a natural depression and receives surface runoff from the surrounding area. Stormwater from a large portion of the upper Leach Creek watershed (about 840 acres) is piped to China Lake, which has an overflow piped to Leach Creek Holding Basin. However, overflows from China Lake have not been observed in recent years because water in the lake infiltrates into the underlying soils.

ESA Listed Fish Species Critical Habitat

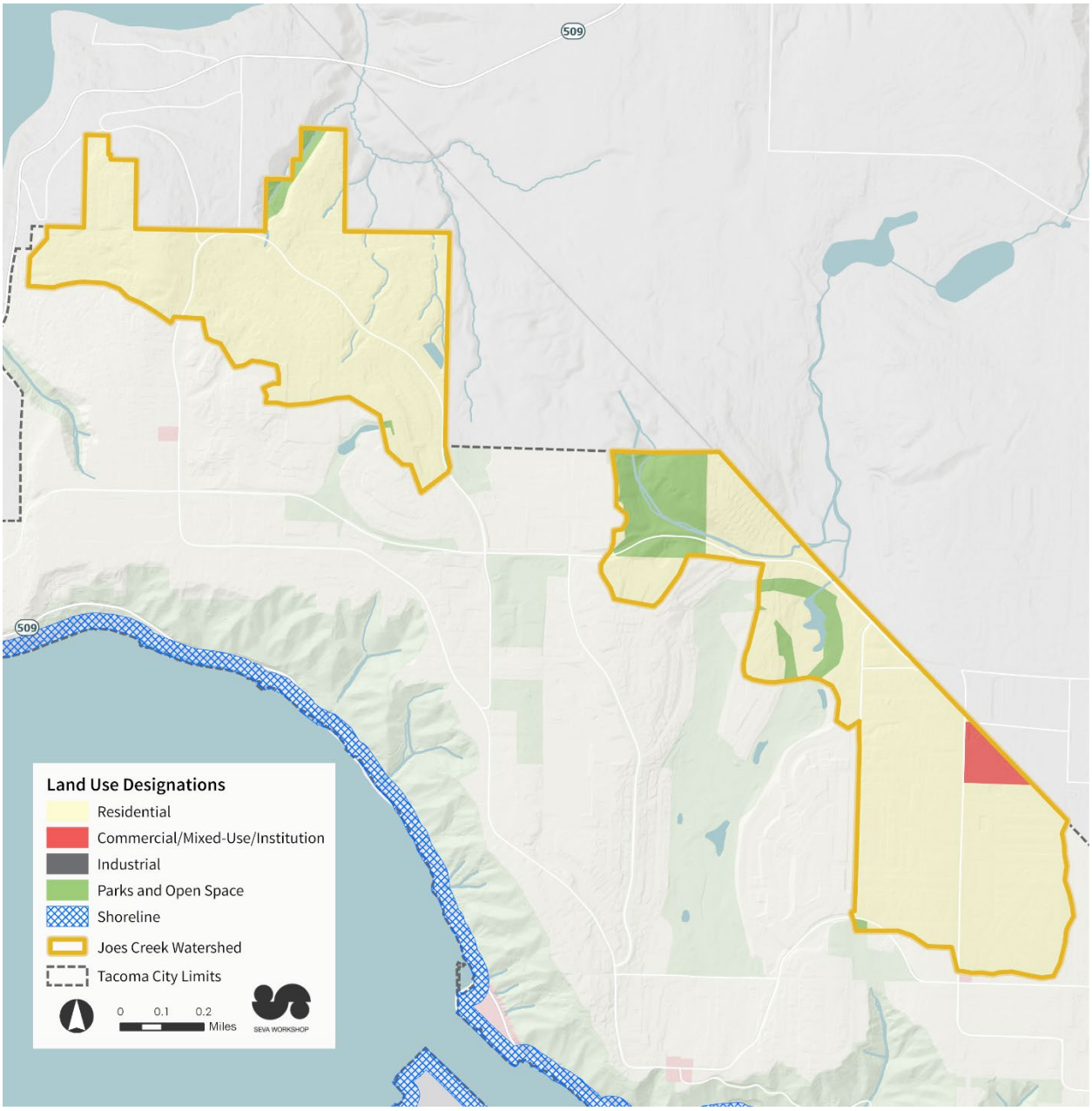
Leach Creek nor Chambers Creek are considered Critical Habitat for Puget Sound Chinook and Puget Sound steelhead. Salmonid spawning habitat can be found along the lower portion of Leach Creek from Chambers Creek up to Bridgeport Way. The upper end of Leach Creek also has pockets of spawning grounds; however, habitat quality is impacted by the elimination of vegetation, channelization by streamside homeowners, and erosion from high storm flows. WDFW's Fish Passage Program has identified the Leach Holding Basin dam as a partial blockage to fish passage. No ESA-listed fish species utilize Leach Creek within the holding basin. However, WDFW has determined presumed presence or documented presence of the following salmonids in Leach Creek:

- Coho, documented spawning
- Summer/Fall/Winter Chum, presence
- Winter Steelhead, presumed presence
- Fall Chinook, presumed presence

Joe's Creek

The Joe's Creek Watershed covers 434 acres making it the smallest watershed in Tacoma. It contains primarily single and multiple-family residential land uses with some open space and undeveloped land. Only two percent of this Tacoma watershed is commercial. The watershed borders unincorporated Pierce County and the City of Federal Way to the north and the Northeast Tacoma Watershed to the south. The Joe's Creek Watershed is part of WRIA-10 Puyallup-White Watershed.

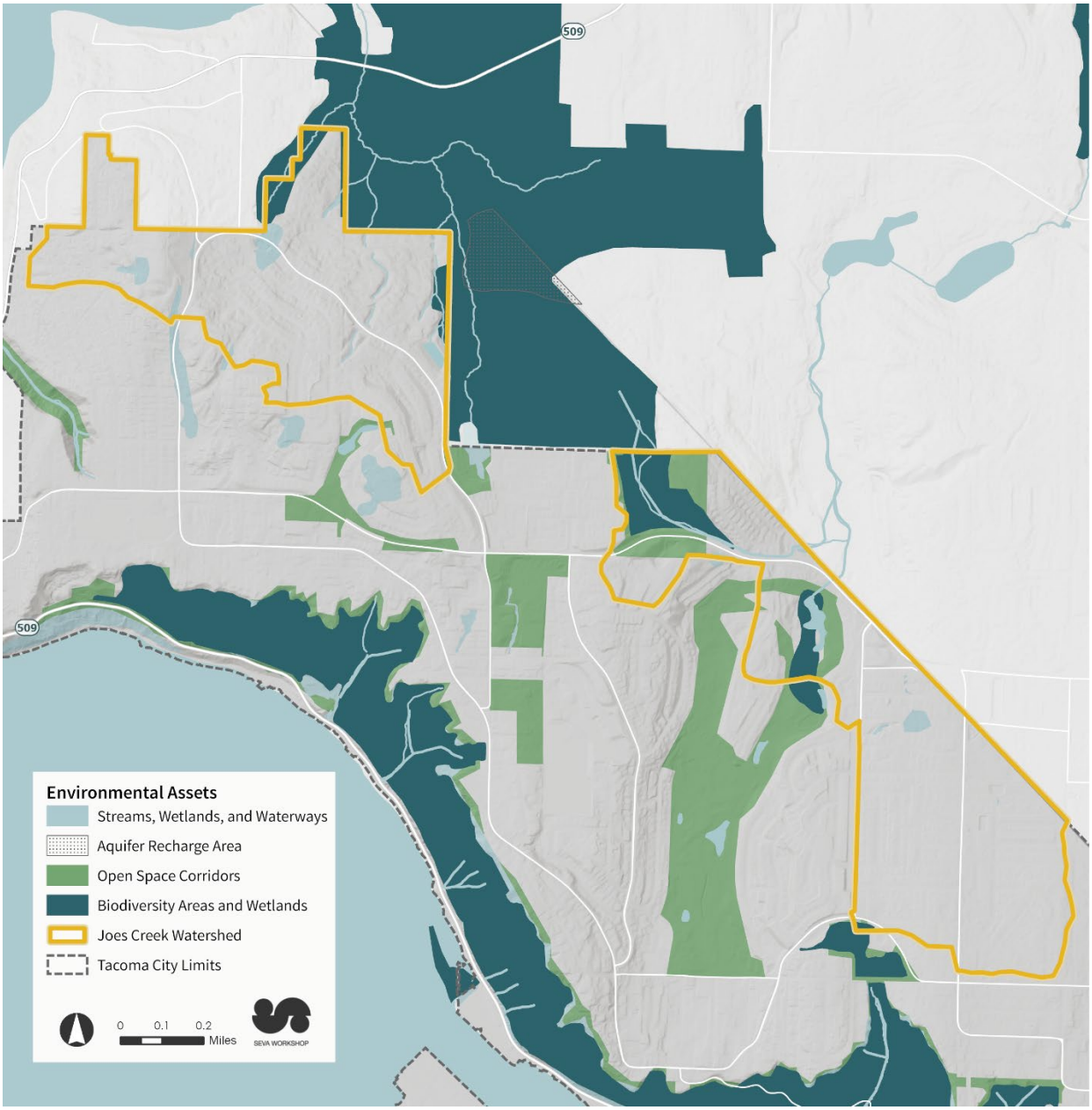
Exhibit 12: Land Use Designation within Joe's Creek Watershed.



Sources: City of Tacoma (*Future Land Use Designation*), 2024; Seva Workshop, 2024

While named the Joe's Creek Watershed, only the eastern portion of the watershed drains to Joe's Creek while the western portion drains just south of Dumas Bay from Dash Point State Park. Joe's Creek is the main freshwater creek in this area. Joe's Creek itself is located in Federal Way, though it receives stormwater discharges from the City of Tacoma. The City is working closely with Federal Way to address nutrient concerns in this watershed.

Exhibit 13: Environmental Assets, Joe's Creek Watershed.



Sources: City of Tacoma (*Streams, Wetlands, and Waterways; Aquifer Recharge Areas; Open Space Corridors*) 2024; Washington Department of Fish and Wildlife (*Biodiversity Areas and Wetlands*), 2024; Seva Workshop, 2024.

Exhibit 14: Environmental Hazards, Joe's Creek Watershed.

Sources: City of Tacoma (Landslides and Erosion Hazards; Flood Hazard Areas; Liquefaction Susceptibility) 2024; Seva Workshop, 2024.

Receiving Waterbodies and Stormwater Facilities

Joe's Creek Sub-basins

Joe's Creek Watershed in Tacoma is divided into three distinct sub-basins. Sub-basin JC01 is the northern most sub-basin draining an area of approximately 243 acres. The land use in this

basin is residential with small pockets of open space steep sloped areas bordering Dash Point State Park. Stormwater from this basin discharges to several gulches leading to freshwater creeks in Dash Point State Park prior to discharging into the Puget Sound just south of Dumas Bay.

The JC02 Sub-basin covers 97 acres and is the only sub-basin that discharges directly to Joe's Creek. Single-family residence is the predominant land-use in this sub-basin. While not showing on the City's watershed boundary maps, the northern pond from the North Shore Golf Course in Northeast Tacoma discharges to headwaters of Joe's Creek. The additional drainage area includes residential areas discharging to this pond.

The JC03 sub-basin covers 93 acres and while the predominant land-use is residential, this sub-basin contains the only pocket of commercial land use in the Joe's Creek Watershed. The City is in the process of requesting GIS information from the City of Federal Way to determine how the water flows through this stormwater conveyance system. It appears that the discharge from the area combines with flows from Joe's Creek and ultimately discharges to Dumas Bay.

Joe's Creek

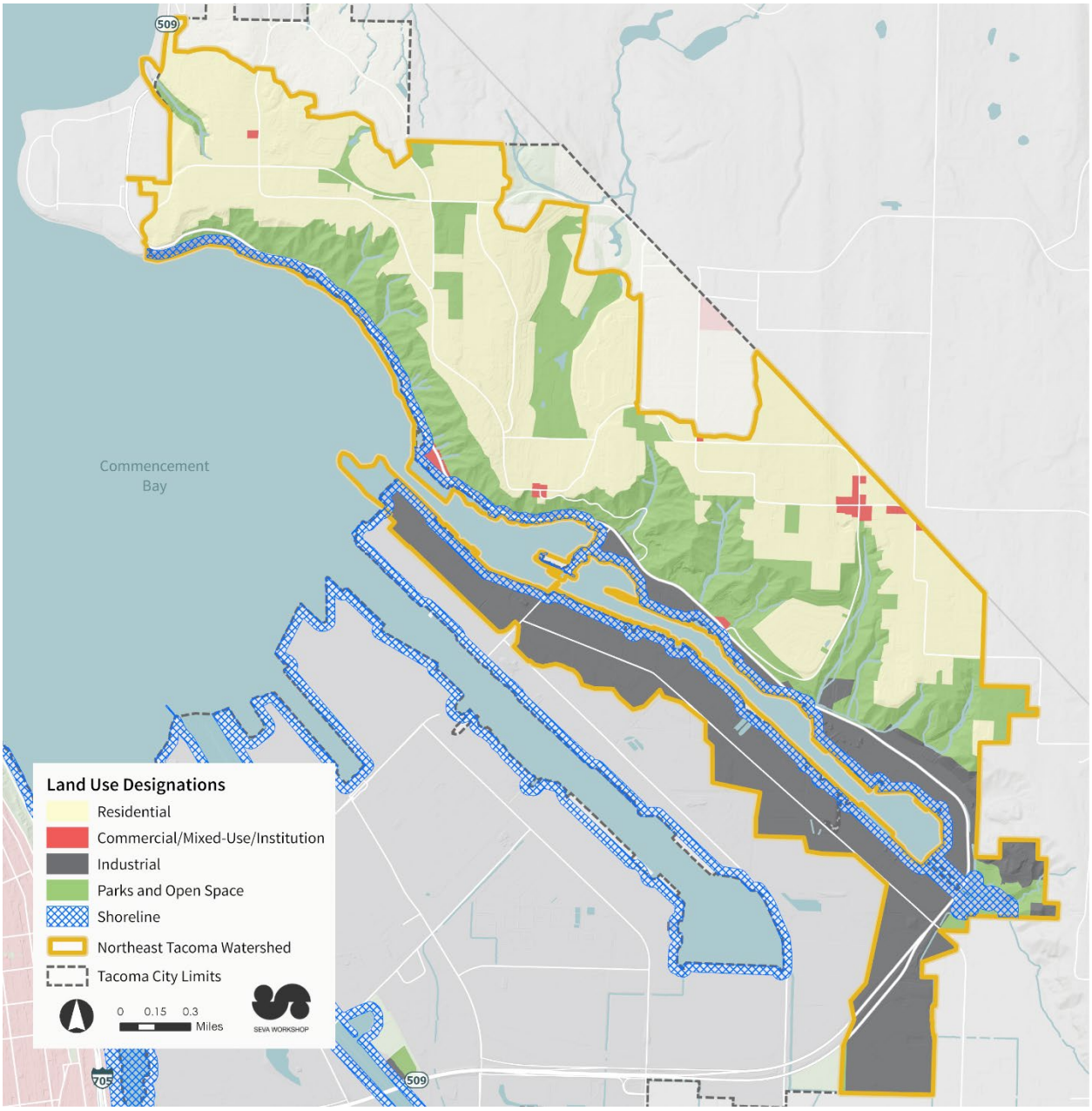
Joe's Creek is a highly modified urban stream that flows north from its origins in the City of Tacoma and through Federal Way for approximately 0.75 miles to Lake Lorene. Lake Lorene discharges over a distance of approximately 700 feet into Lake Jean. These lakes are located in Federal Way and known as the Twin Lakes. Lake Jean discharges into Lower Joe's Creek, which flows north for approximately 1.1 miles to Dumas Bay in the Puget Sound.

The lower part of the creek is used by salmonid species. While this use is moderate, the lowermost portion of the creek provides the largest and best quality reach of salmonids spawning and rearing habitat in the southwest portion of King County. This habitat is threatened by loss and degradation of riparian conditions, excessive sedimentation, and trash deposits where it discharges into the Puget Sound in Dumas Bay. Three streams drain into the urban 40-acre Dumas Bay, including Joe's Creek.

Northeast Tacoma

The Northeast Tacoma Watershed covers 2,641 acres. Pierce County and the City of Federal Way border the area to the north and east, the City of Fife borders the south, and the industrial Tideflats Watershed borders the west of this watershed. Much of the watershed contains steep slopes and bluffs with several intermittent streams that flow into Commencement Bay. Marine View Drive (Highway 509) separates the steep sloped areas of the NE Tacoma Watershed from the Hylebos Waterway. The upper watershed consists primarily of residential land uses with open spaces and undeveloped land while the lower watershed supports industrial uses along the Hylebos Waterway, which connects Hylebos Creek with Commencement Bay. The Northeast Tacoma Watershed is part of WRIA-10 Puyallup-White Watershed.

Exhibit 15: Land Use Designation within Northeast Tacoma Watershed.

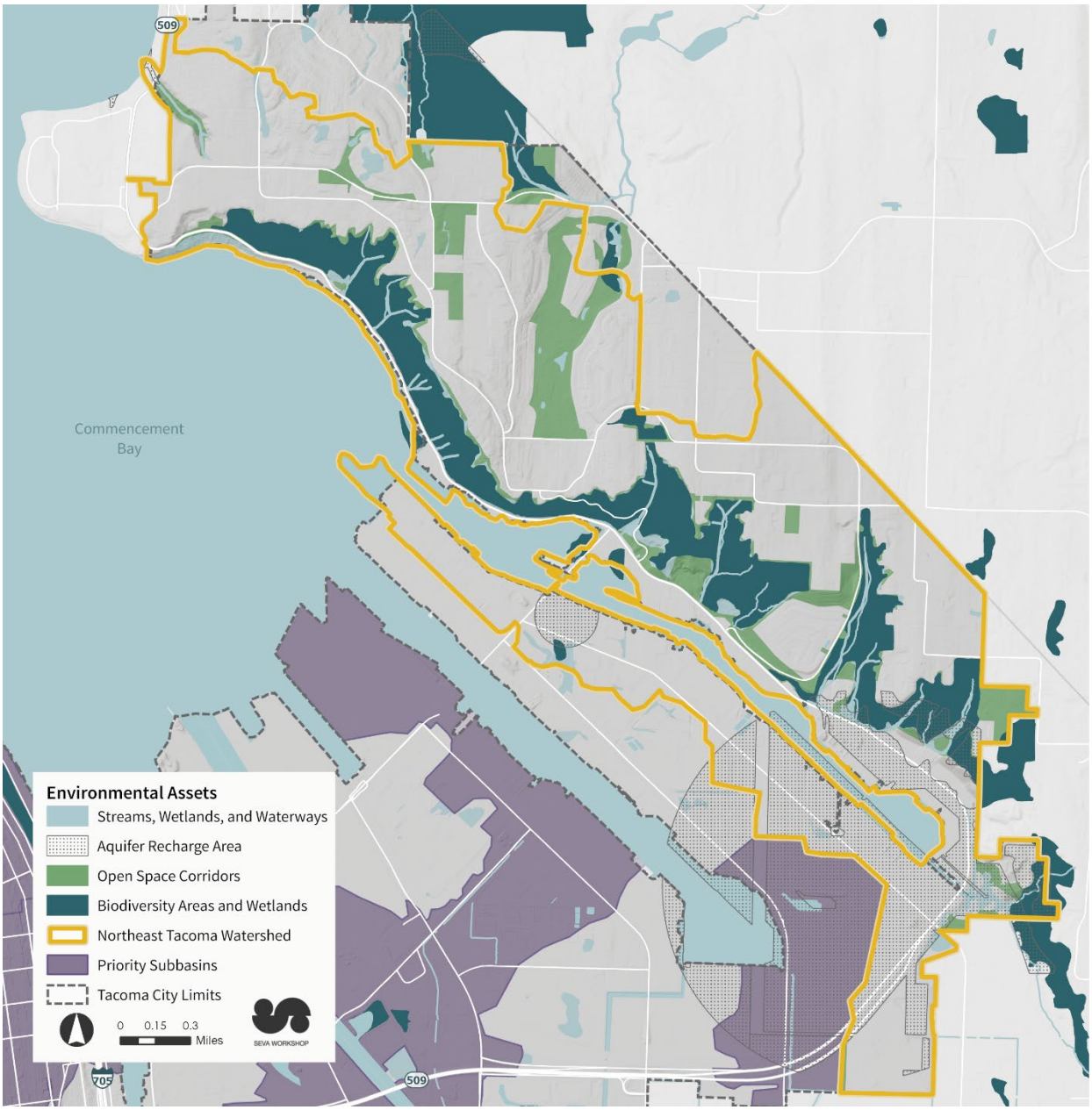


Sources: City of Tacoma (Future Land Use Designation), 2024; Seva Workshop, 2024

The gulches and wetlands in this area generally have intermittent water flow due to seasonally fluctuating groundwater. Groundwater seepage combined with sandy soils and steep slopes creates a large potential for erosion and results in frequent landslides occurring during winter months along Marine View Drive. In order to reduce water flow and prevent flooding of nearby businesses, detention systems were built in the gulches. Although some of the gulches have adequate flow to support fish, culverts and other obstructions block fish passage.

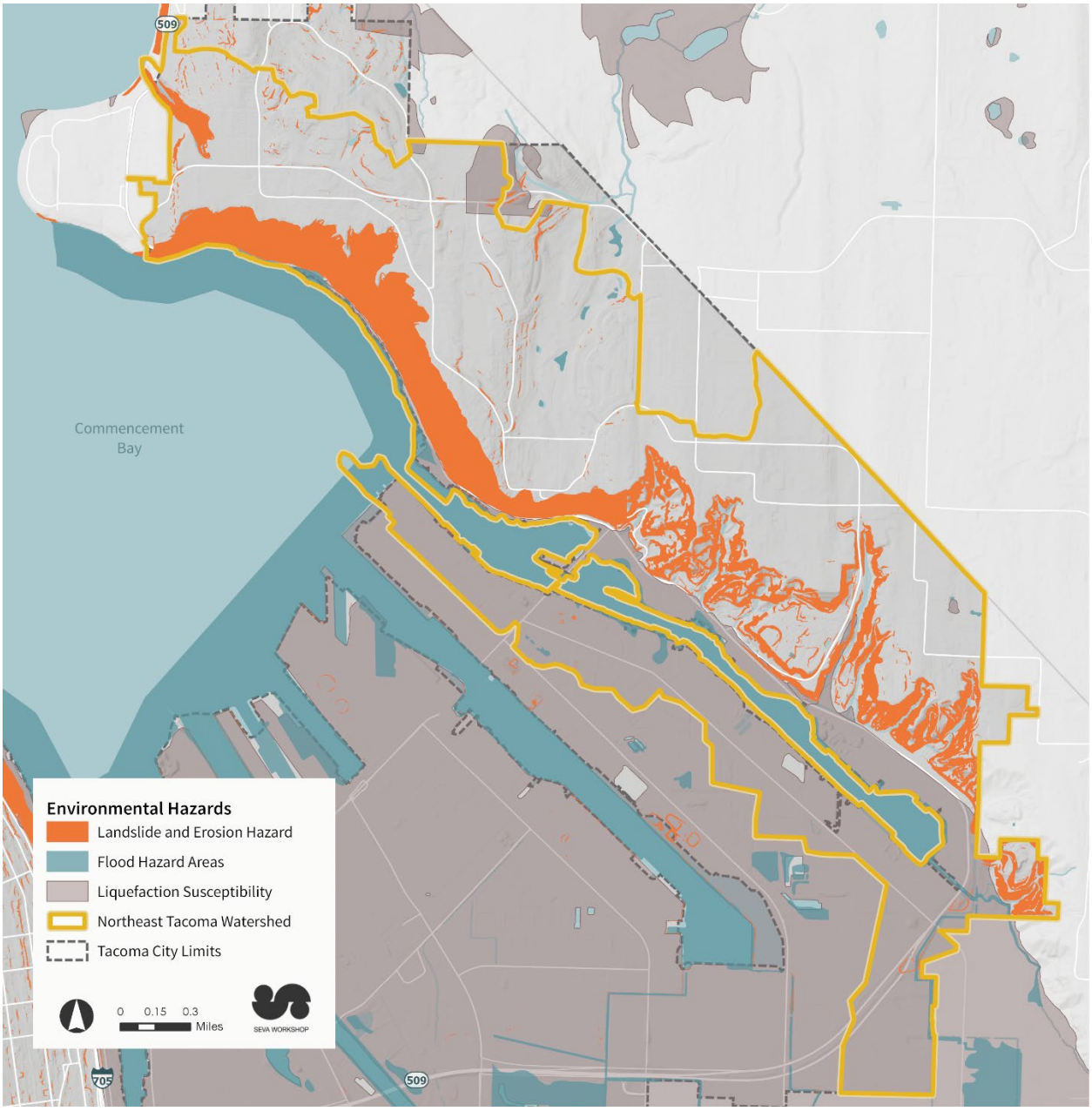
The City actively manages the vegetation in a few Open Space properties in this watershed including Julia's Gulch. The vegetation in these areas is dominated by invasive and noxious weeds including poison ivy and poison oak.

Exhibit 16: Environmental Assets, Northeast Tacoma Watershed.



Sources: City of Tacoma (*Streams, Wetlands, and Waterways; Aquifer Recharge Areas; Open Space Corridors; Priority Subbasins*) 2024; Washington Department of Fish and Wildlife (*Biodiversity Areas and Wetlands*); Seva Workshop, 2024.

Exhibit 17: Environmental Hazards, Northeast Tacoma Watershed.



Sources: City of Tacoma (Landslides and Erosion Hazards; Flood Hazard Areas; Liquefaction Susceptibility) 2024; Seva Workshop, 2024.

Receiving Waterbodies and Stormwater Facilities

Northeast Tacoma Sub-basins

The Northeast Tacoma Watershed is divided into six drainage sub-basins. Five of these sub-basins discharge to the south of Brown's Point into the Hylebos Waterway and Commencement Bay, while sub-basin NE01 discharges directly into the Puget Sound north of Brown's Point.

The NE01 sub-basin receives discharges from a small residential area in the northern portion of this watershed bordering Joe's Creek and the Pierce County-side of Brown's Point. Stormwater runoff from this basin discharges to Dry Gulch. The gulch begins at the end of 52nd Street Northeast and crosses into Pierce County prior to discharging north of Brown's Point into the Puget Sound. The gulch primarily receives stormwater discharges from three locations: a 54-inch pipe discharging at the top of the gulch behind 1509 51st Street, a 12-inch pipe discharging to the gulch at 53rd Street, and an 18-inch pipe discharging near Overlook Avenue. Fish passage is not possible in this gulch since baseflow is intermittent and due to steep slopes and fish passage barriers.

The NE02 sub-basin receives runoff from a completely residential area of Northeast Tacoma and borders the Pierce County-side of Brown's Point to the west. Almost half of this sub-basin consists of steep slopes with some wetlands, but no significant stream systems.

The NE03 sub-basin drains to the northern side of Hylebos Waterway. This is a primarily residential basin with steep slopes and wetlands on the southern border along the shoreline. There are two large stormwater-fed gulches that discharge at 5002 and 4606 Marine View Drive. Both sites have erosion, flooding, excessive sedimentation, and invasive species. The three smaller gulches to the southeast drain residential areas in this sub-basin and discharge into the Hylebos Waterway: Charlie's Gulch, Ole's Gulch, and Loma Court Gulch. All three gulches have issues with erosion along the steep slopes. These gulches do not receive discharges from the City's stormwater systems with the exception of a 10-inch pipe discharging into Loma Court Gulch from Loma CT NE. As the gulches receive very little piped stormwater flow, the majority of stormwater in this basin discharges into the Hylebos Waterway at an outfall near 3622 Marine View Drive.

The NE04 sub-basin drains directly to the Hylebos Waterway. The area bordering Federal Way is primarily residential and either discharges directly into the Hylebos or drains into one of the six gulches in this sub-basin. The area at the bottom of the gulches along the Hylebos Waterway is occupied by industrial uses. The majority of the industries along the northern side of the Hylebos Waterway are privately-owned and discharge stormwater runoff directly to the Hylebos Waterway. McMurray Gulch is located at the head of the Hylebos Waterway. This large gulch receives stormwater runoff from a 10-inch pipe off 45th Avenue Northeast and there is extreme erosion associated with this outfall. Coski Gulch, Morning Side Ditch, and Manke Gulch also receive discharges from the City's stormwater collection system. Julia's Gulch, Metal Gulch, and McBride Gulch do not receive piped stormwater. All of the gulches in this sub-basin have varying severity of erosion and invasive species issues. None of the gulches are

accessible to fish due to low baseflows, steep slopes, and physical barriers such as culverts, roadways, and pipes; therefore, the area is not considered viable fish habitat.

The NE05 sub-basin contains mainly industrial properties at the head of the Hylebos Waterway. This sub-basin includes the lower reach of Hylebos Creek, the only fish-bearing stream in the Northeast Tacoma Watershed.

The NE06 sub-basin makes up the portion of land discharging into the Hylebos Waterway on the southern side of the waterway. Land use in this area is industrial with all properties discharging directly into the Hylebos Waterway. The Port of Tacoma owns the majority of properties in this sub-basin. This sub-basin also includes the federally-listed contaminated Superfund site of Occidental Chemical.

Commencement Bay

Information on Commencement Bay is found in the Lower Puyallup Watershed Section and Thea Foss Waterway Watershed Section.

Hylebos Creek

Hylebos Creek is the major tributary to the Hylebos Waterway and drains approximately 12,000 acres from tributaries in Federal, Milton, Edgewood, King County, Pierce County, and Fife to the mouth of the creek at the Hylebos Waterway in Commencement Bay. The lower portion of the Hylebos moves through Puyallup Tribal lands. The Muckleshoot Tribe also maintains fishing rights on Hylebos Creek.

The Hylebos Creek Watershed consists of approximately 350 miles of streams and 250 acres of wetlands and is believed to have been one of the most productive small stream systems in the southern Puget Sound. Historical accounts indicate the system supported several thousands of Coho and Chum plus hundreds of chinook, steelhead, and cutthroat trout. Overtime this fish habitat was severely altered from its historical natural state due to development and urbanization. Residential development, erosion, channelization, and frequent flooding threaten the creek and associated riparian habitat.

The Hylebos Creek Mitigation Site is located in the intertidal reach of Hylebos Creek on the right bank of the lower Hylebos Creek and is part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project. Non-native invasive species were removed from this site and replaced with native plants. Where possible with the least disturbance to native vegetation, small off-channel “fingers” were excavated into the existing bank to allow water inundation during periods of high freshwater flows or tidal surges. This site provides habitat for out-migrating juvenile salmonids that pause here while acclimatizing to saltwater.

The Place of Circling Waters is a National Resource Damage Assessment (NRDA) mitigation site located along Hylebos Creek at the foot of Northeast Tacoma. Together, this off-channel habitat and the preserved upland areas support local Coho, Chinook, and Chum salmonid species. Amphibians and bird species will also benefit from the wetland enhancement.

The Hylebos Creek Estuarine Restoration Project is a 6.7-acre site located adjacent to Hylebos Creek near Commencement Bay. Historically, the site supported tidal wetlands; however, by 1996 the site had been isolated from Hylebos Creek by a fabricated berm, was dominated by non-native species, contained several structures, and a significant amount of debris. The Restoration Project converted the property into a functioning estuarine marsh featuring intertidal channels and forested upland. The re-established estuarine habitats have replaced a limited resource within the Hylebos Creek Watershed and have restored natural habitat-forming processes for the benefit of Chinook salmon, steelhead, bull trout, and other native fish and wildlife species.

Hylebos Waterway

The Hylebos Waterway is one of seven waterways situated within the Commencement Bay Tideflats, an estuary that receives fresh surface water from Hylebos Creek. Aquifers within the Puyallup Valley and the adjacent uplands also contribute fresh water to the waterway.

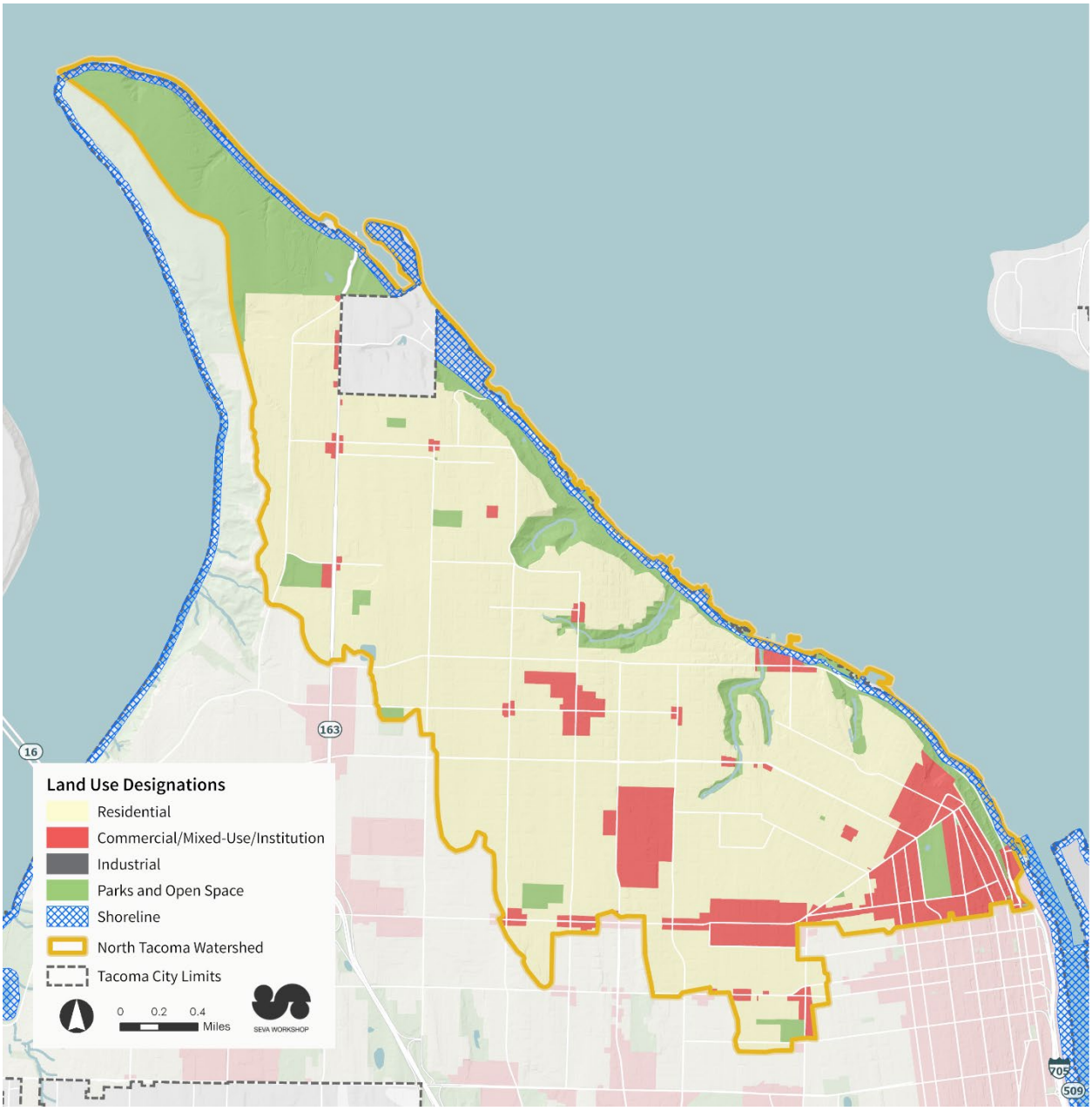
The Port of Tacoma extended the Hylebos Waterway in the 1960s to a 200-foot wide, 3-mile long waterway. Only 25 percent of that surface water remains due to filling, channeling, and underground piping of surface waters. Hylebos Waterway also receives the direct runoff from the surrounding Tideflats. The industrial development of the area and the straightening and channeling of Hylebos Creek to form the current Hylebos Waterway destroyed much of the historic juvenile salmon and wildlife habitat.

The Hylebos Waterway is currently listed as a Category 5 on the State's 303d list for dieldrin, PCBs, chlorinated pesticides, DDT, and HPAH. The Hylebos Waterway is also listed as a Superfund site as part of the Commencement Bay Nearshore Tideflats Superfund site. EPA placed Commencement Bay on the Superfund National Priorities List in 1983 after discovering widespread contamination. Fifty-eight percent of the area (167 of the 285-acre area listed) requires cleanup. In addition to the cleanup of the waterway, environmental cleanup occurred at several contaminated upland sites along the Hylebos at the Wasser Winters site and Occidental Chemical Corp site.

North Tacoma

The North Tacoma Watershed drains approximately 4,766 acres and encompasses the northern portion of Tacoma and the City of Ruston. The watershed is part of WRIA-12 Chambers-Clover Creek Watershed. The area is predominately residential with some commercial areas as seen in Exhibit 18. Notable places within this watershed include Point Defiance Park, the North End Wastewater Treatment Plant, and the former ASARCO smelting site, which is part of the Commencement Bay Nearshore/Tideflats Superfund site.

Exhibit 18: Land Use Designation within North Tacoma Watershed.



Sources: City of Tacoma (Future Land Use Designation), 2024; Seva Workshop, 2024

In 2015, the City collaborated with Metro Parks Tacoma to install a Regional Stormwater Treatment Facility at Point Defiance Park. This stormwater facility is designed to improve the quality of stormwater discharging to Commencement Bay, treating up to 8 million gallons per day from the watershed's 754 acres. The treatment facility uses bioretention soil mix to filter stormwater and reduce the load of fine sediment, metals, oils and grease from cars, and nutrients and bacteria from pet waste, and landscape maintenance.

There are several water bodies within this watershed including Ruston Creek, Asarco Creek, Puget Creek, Mason Creek. and the stream associated with Garfield Gulch. Puget and Mason Creeks are perennial and have steep slopes associated with them.

Critical issues in the North Tacoma watershed include impaired nearshore habitats along the shoreline of Commencement Bay, erosion and sediment problems on steep slopes in the northern portion of the watershed, historic contamination, and fish access.

Exhibit 19: Environmental Assets, North Tacoma Watershed.

Sources: City of Tacoma (*Streams, Wetlands, and Waterways; Aquifer Recharge Areas; Open Space Corridors; Priority Subbasins*) 2024; Washington Department of Fish and Wildlife (*Biodiversity Areas and Wetlands*); Seva Workshop, 2024.

Exhibit 20: Environmental Hazards, North Tacoma Watershed.

Sources: City of Tacoma (Landslides and Erosion Hazards; Flood Hazard Areas; Liquefaction Susceptibility) 2024; Seva Workshop, 2024.

Receiving Waterbodies and Stormwater Facilities

Schuster Parkway and Garfield Gulch

There are four sub-basins discharging to Commencement Bay from the Schuster Parkway area. The southernmost sub-basins encompass the residential and commercial areas of downtown Tacoma to the Stadium District and include discharges from Tacoma General Hospital and Wright Park. There is extensive re-development planned for this area, including underground utility replacement and the extension of the downtown Sound Transit Link light rail system. There has also been significant restoration work along the open space area of Schuster Parkway to assist with slope stabilization.

Garfield Gulch has a low flow intermittent stream. Fish passage is not feasible in this area due to the physical barriers of the culvert and limited flow. Stormwater from the sub-basins is conveyed through stormwater pipes that ultimately connect to the stormwater mainline located under Garfield Gulch, which continues through a culvert under Ruston Way, and discharges to an outfall into Commencement Bay near the head of the Foss Waterway.

Buckley Gulch Drainage Area and Buckley Creek

Historically, the mouth of Buckley Creek was located where Old Town Park sits today. As sawmills moved into the area, the creek was altered to create a fresh water pond for the Dickman Mill operation at the creek's mouth. In 1925, Ruston Way was built, and the creek was directed into a culvert pipe discharging into the Puget Sound near Hamilton Park.

There is another small side-channel stream that extends to the east between Carr Street and Orchard Road and crosses over privately owned parcels. This stream combines with the main channel of Buckley Creek near Ursich Park where it enters the City's stormwater system. The stormwater pipes collect runoff from the residential and commercial areas of this sub-basin and discharges to a marine outfall near Hamilton Park after crossing under Ruston Way. Unlike other gulches in North Tacoma, there is no designated trail or public use access through Buckley Gulch. The open space area of Buckley Gulch (sometimes known as "Old Town Gulch") originates near N 16th and Junett.

Puget Gulch Drainage Area and Puget Creek

Puget Creek is approximately 1,600 feet long with perennial flows averaging about 2.9 cubic feet per second (cfs). Most of the historical flow is collected and conveyed through City's stormwater system, which runs under the length of the Puget Gulch and discharges into Commencement Bay near Dickman Park under Ruston Way.

In March 2002, a wetland delineation was conducted; the delination identified and classified the wetlands located in the lower section of Puget Gulch where the Puget Creek originates and downstream of the area. There are multiple wetlands ranging in scale from Category II to Category III wetlands.

Over the past decade, Puget Creek has been the subject of interest by several groups concerned with restoring this open space, including the Puget Creek Restoration Society. This group worked with the City to reintroduce salmon to Puget Creek by improving fish access and vegetative cover in Puget Gulch and worked to restore the trail connecting the Proctor Area with Ruston Way. A fish ladder was installed in 1997 to provide fish access to the creek, which is designed to provide access to the creek by salmonids during high tide. Members of the Puget Creek Restoration Society stated that spawning Coho was observed in Puget Creek in 2001 and 2003. WDFW has documented the presence of both Coho Salmon and Residential Coastal Cutthroat Trout in Puget Creek.

Puget Gulch provides beneficial habitat for a variety of wildlife including muskrats, Cooper's hawks, red foxes, great horned owls, raccoons, possums, deer, eagles, red tail owls, bard owls, mountain beavers, and numerous birds, as referenced in the Puget Creek Watershed Management Plan. Eelgrass beds exist in Commencement Bay near the mouth of the creek and are important habitat for salmon fry.

Mason Gulch Drainage Area and Mason Creek

Mason Creek drains Mason Gulch, a 36-acre undeveloped ravine located in the North Tacoma Watershed. This drainage sub-basin is mostly residential, and stormwater runoff is collected and conveyed through several outfalls located along Ruston Way. Both the stormwater and wastewater collection systems are located around the upland edges of the gulch and do not follow the alignment of Mason Creek, which flows down the center of the gulch. The creek is collected in the stormwater inlet structure at the lower end of the gulch just above the North End Wastewater Treatment Plant.

The main stem of Mason Creek flows perennially, primarily fed by groundwater seeps and water discharging from a pipe on the northeastern hillslope near the upper end of the gulch. The creek channel is approximately 8 feet wide. There are also small tributary streams in the gulch approximately 2 to 5 feet in channel width. The tributaries are generally steep, fast-moving riffles, but in some areas contain step-pool channels formed by large woody debris. Approximately 1,170 feet downstream of its headwaters, Mason Creek enters a 980-foot-long culvert at the western edge of the North End Wastewater Treatment Plant. Stream flows at culvert inlet have been measured at rates between 2 to 16 cfs.

In 2014, management of the properties in Mason Gulch were transferred to the City's Environmental Services Department Open Space Management Program with the intent of improving both water quality and quantity through restoration of this site. As of December 2019, the City has restored close to one acre of steep slopes at the top of the gulch. This work included removing invasive weeds, installing natural erosion control materials across the entire area, and installing 4,352 plants. An additional 1.5 acres of invasive plant species were treated in the lower reaches of the gulch, and 30 native evergreen trees were planted in this area.

The creek's steep gradient, shallow water depths, and non-fish-passable culvert make it inaccessible to anadromous fish and is therefore of limited habitat value for many species of

salmon. Nonetheless, the creek and Mason Gulch do provide habitat for a variety of other species, including songbirds, mammals, insects, and amphibians.

Point Defiance and Ruston Drainage Area

The Point Defiance and Ruston drainage areas contain the northern most sub-basins in this watershed, which have various current land uses and a diverse history. This drainage area contains the historic Asarco Smelter Site, which is part of the Commencement Bay Near Shore/TideFlats Superfund site. Point Ruston LLC is in the process of cleaning up the former smelter property as part of a large mixed use residential and commercial Built Green community, under EPA's continued oversight.

Commencement Bay and Dalco Passage

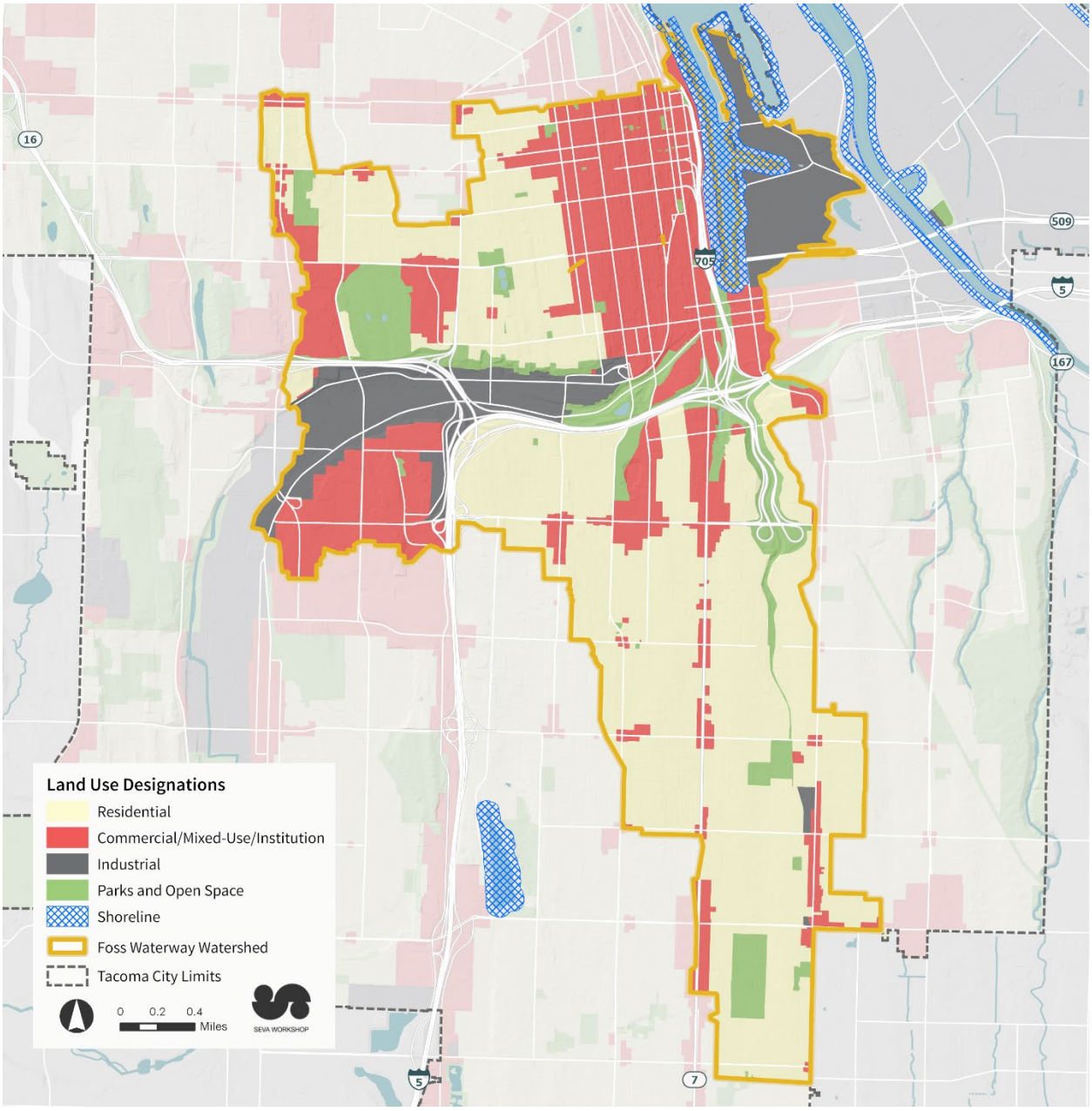
Commencement Bay is surrounded by the Port of Tacoma at the southern end, Point Defiance on the west, and Browns Point on the east separating Commencement Bay from the open Puget Sound. Commencement Bay is one of the most active ports in the region.

The Asarco Smelter Area in Commencement Bay was identified by the EPA as a priority area requiring remediation by EPA through Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly referred to as the Superfund Program, as part of the Commencement Bay Nearshore/Tideflats site. The North Tacoma stormwater asset sub-basin NT-02 currently outfalls near the old Asarco Smelter site at the Dalco Passage and East Passage. This nearshore area is listed as an impaired waterbody for arsenic, copper, lead and zinc.

Thea Foss Waterway

The Thea Foss Waterway Watershed, also known as the "Foss Watershed," covers approximately 5,864 acres and drains most of south-central Tacoma. There are currently no streams or creeks remaining in the watershed. Foss Waterway Watershed is part of the WRIA 10 Puyallup-White Watershed and is located in the South-Central Puget Sound action area for Puget Sound Recovery. The two major receiving waterbodies, Thea Foss and Wheeler-Osgood Waterways, were transformed from the original Puyallup River Delta into waterways with a variety of marine industrial uses, and more recently into today's Downtown Tacoma. The watershed is bordered by the North Tacoma Watershed on the north, Lawrence Street on the west, and East F to East K Streets on the east side of the Thea Foss Waterway. The area extends to the southeast corner of the City limits at 86th Street. The land use in this watershed is residential and commerical as seen in Exhibit 21. Currently, the Foss Watershed is approximately 53 percent impervious.

Exhibit 21: Land Use Designation within Thea Foss Waterway Watershed.

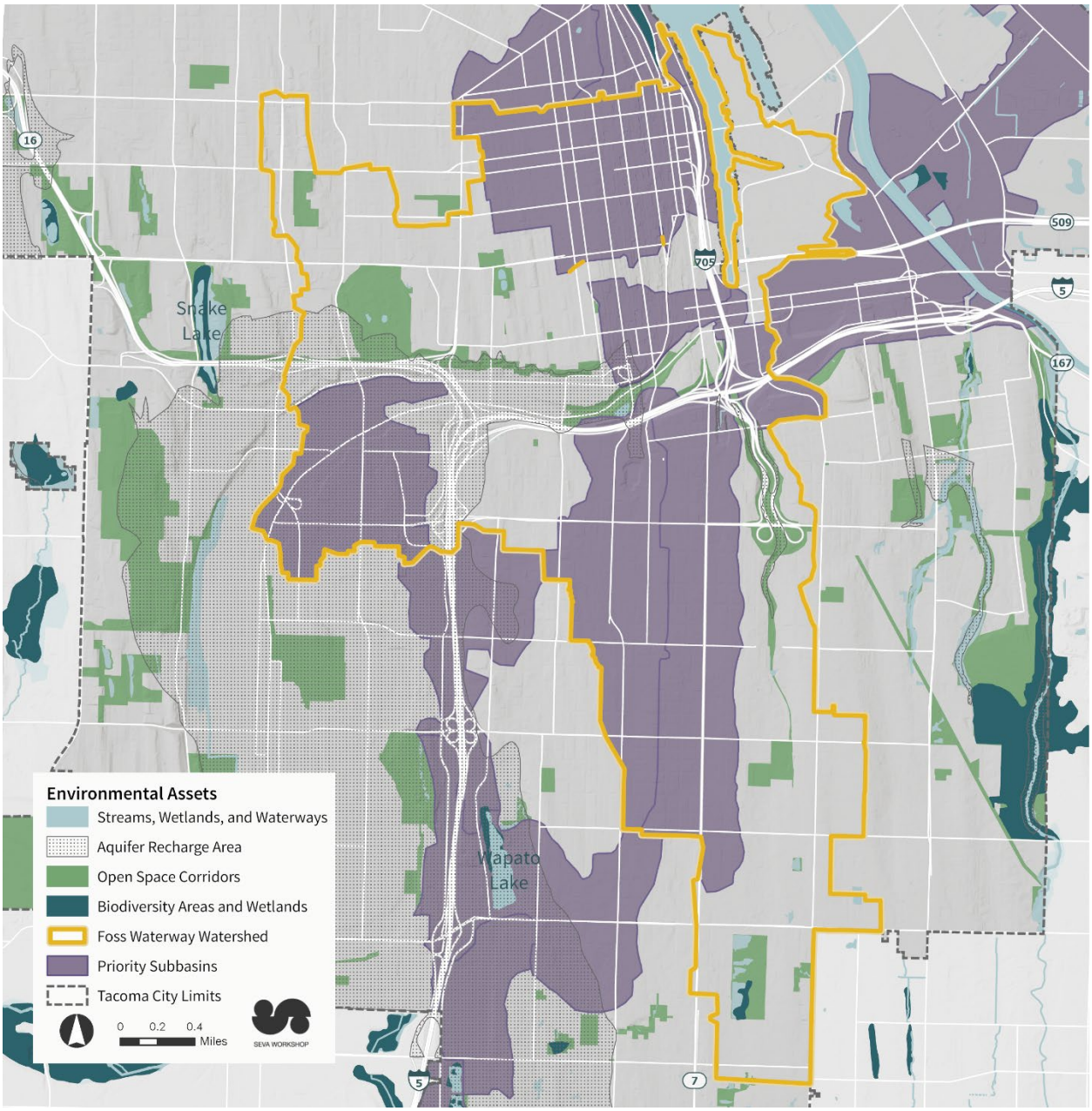


Sources: City of Tacoma (Future Land Use Designation), 2024; Seva Workshop, 2024

Until 1995, there were approximately 65 public and private stormwater outfalls that discharged to the Foss Waterway. Stormwater discharges from the Foss Watershed ultimately reach the waterways and the southeastern margin of Commencement Bay. With redevelopment of the area, the number of known outfalls has decreased to 35, which includes 15 municipal outfalls and 20 private outfalls. Ninety-eight percent of the watershed drains through 8 outfalls. Natural drainages containing creeks and groundwater flows, were sewered in the 1960s and currently

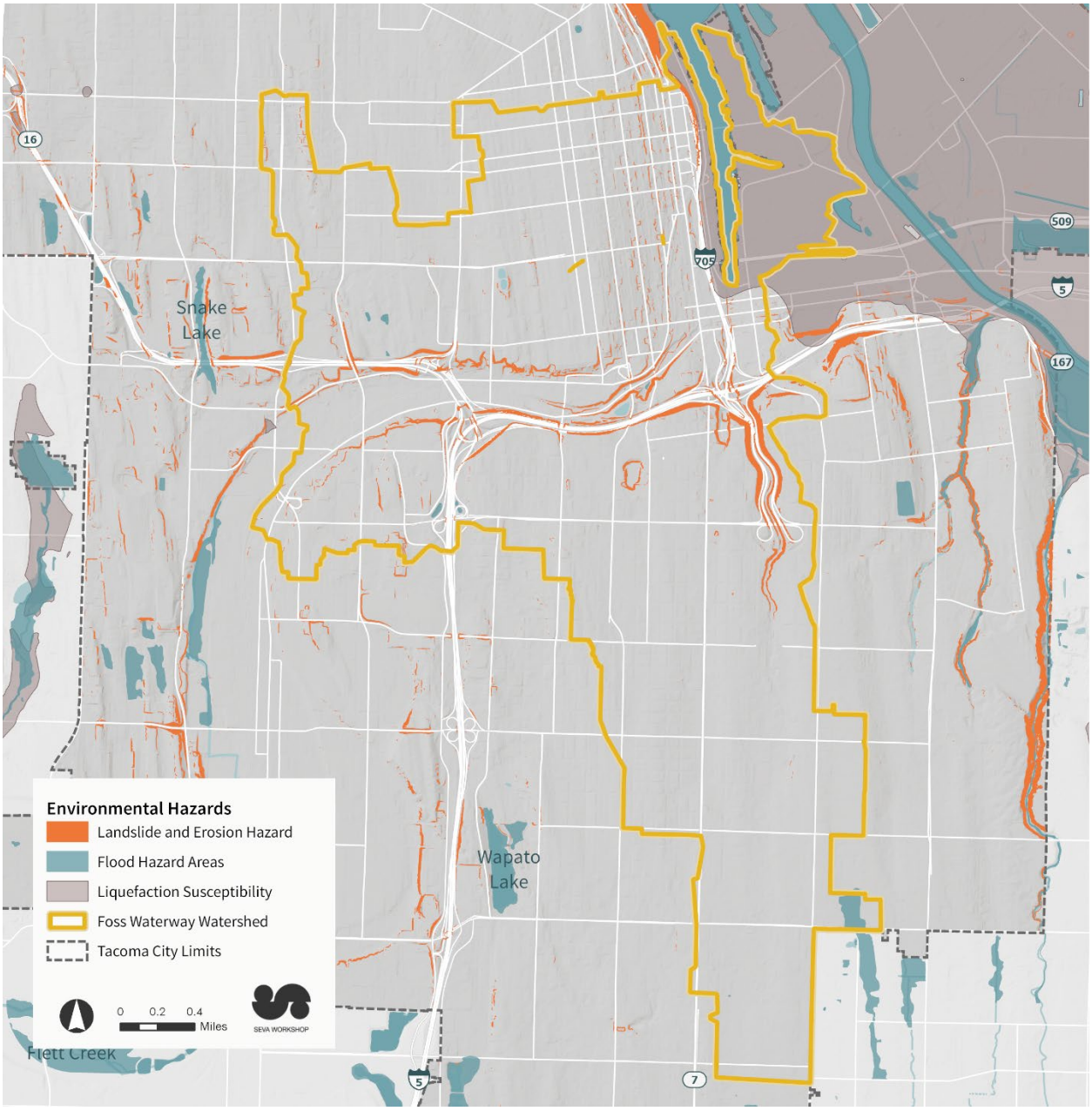
exist as baseflow in several of the stormwater pipes that discharge into the waterway. In addition, several of the outfalls discharging to Foss Waterway are tidally-influenced and portions of the pipe are inundated with marine water twice a day depending on the pipe elevations and the high tide elevation.

Exhibit 22: Environmental Assets, Thea Foss Waterway Watershed.



Sources: City of Tacoma (*Streams, Wetlands, and Waterways; Aquifer Recharge Areas; Open Space Corridors; Priority Subbasins*) 2024; Washington Department of Fish and Wildlife (*Biodiversity Areas and Wetlands*); Seva Workshop, 2024.

Exhibit 23: Environmental Hazards, Thea Foss Waterway Watershed.



Sources: City of Tacoma (Landslides and Erosion Hazards; Flood Hazard Areas; Liquefaction Susceptibility) 2024; Seva Workshop, 2024.

Receiving Waterbodies and Stormwater Facilities

Thea Foss and Wheeler-Osgood Waterways

Prior to the late 1800s, what is now Thea Foss Waterway (formerly the City Waterway) was the old west channel branch of the Puyallup River delta. In 1891, the Tacoma Land Company

dredged portions of the waterway to construct a navigation channel. The flood of 1981 caused the Tacoma Land Company to further divert the Puyallup River, resulting in the upper portion of the remnant mouth of this branch of the Puyallup River to become what is now known as the Wheeler-Osgood Waterway.

The Thea Foss and Wheeler-Osgood Waterways are estuarine waterways on the southeastern margin of Commencement Bay. The Thea Foss Waterway lies generally north-south along the City's downtown corridor. The Wheeler-Osgood Waterway lies west-east and connects to the east side of the Thea Foss Waterway just south of the Murray Morgan (11th Street) Bridge.

The Thea Foss and Wheeler Osgood Waterways were identified by EPA as Problem Areas requiring remediation under the CERCLA as part of the Commencement Bay Nearshore/Tideflats site. The City of Tacoma took the lead in remediating sediments in a large portion of the Thea Foss and Wheeler-Osgood Waterways under the oversight of EPA with work completed in 2006. Sediments were actively remediated with a combination of dredging and capping at various locations within the waterways, and are monitored routinely under a Long Term Monitoring Plan to ensure that the remedy remains protective.

The waterways are the discharge point for a highly urbanized drainage basin with residential, commercial, and industrial land uses and transportation corridors. Sources of Contaminants of Concern (COCs) continue to exist in the drainage basins and are conveyed to the waterway via stormwater runoff from municipal right-of-ways and private properties, aerial deposition, marinas, and groundwater discharges. The contaminants identified as having the greatest potential to affect sediment quality following the cleanup action include polycyclic aromatic hydrocarbons (PAHs) and phthalates. Since stormwater is one of the potential sources of contamination, the City has been implementing a comprehensive monitoring and source control strategy in the Foss Waterway Watershed since 2001. Stormwater monitoring is required under the Thea Foss Waterway Consent Decree (CD) with EPA. It also meets the monitoring requirements of the National Pollutant Discharge Elimination Systems (NPDES) Permit.

As part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project, habitat mitigation sites were constructed along the Foss Waterway, in the Lower Puyallup and Tideflats Watersheds, and along Hylebos Creek in the City of Fife. In the Foss Waterway Watershed, habitat enhancement sites were constructed at four locations along the shoreline of the waterway as part of the remediation project that was completed in 2006. These sites are the Johnny's Dock Habitat Enhancement, Head of Thea Foss Shoreline Habitat, SR 509 Esplanade Riparian Habitat, and Log Step Habitat Enhancement. Additionally, slope rehabilitation along the shoreline of the Thea Foss Waterway was also performed by the City to provide more suitable habitat in these intertidal areas. Habitat improvement areas are routinely maintained (garbage and invasive removal) and periodically qualitatively monitored to ensure that they continue to provide the intended habitat function.

ESA Listed Fish Species Critical Habitat

Foss Waterway, Commencement Bay, and the South-Central Puget Sound are rearing and migratory areas for several fish populations including several species of salmon. A complete list

of ESA listed species for WRIA-10 Puyallup-White Watershed is included in the Lower Puyallup ESA Section.

Tideflats

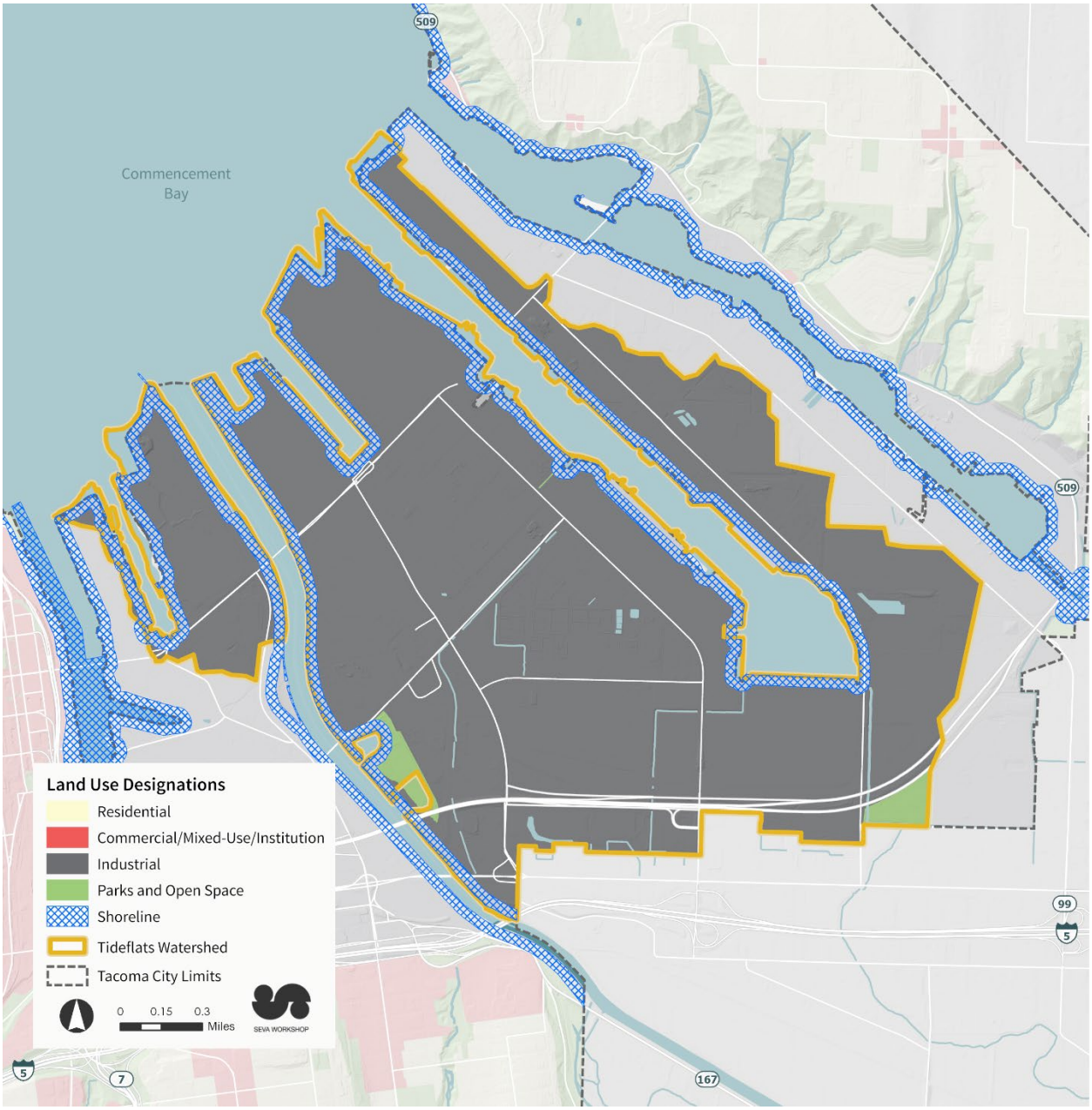
The Tideflats Watershed covers 2,112 acres and is the most highly industrialized and commercialized portion of Tacoma. The watershed is also part of WRIA-10 Puyallup-White Watershed. Historically, the area was a salt marsh, mudflat, and wetlands; however, over the centuries of industry led to the straightening of the Puyallup River as well as dredging and infill of the estuary.

Most of the city's heavy industrial facilities are located here along the Sitcum, Blair, and Hylebos Waterways. The Tideflats Watershed is bordered by the Lower Puyallup Watershed on the south and west, Foss Waterway Watershed to the west, Northeast Tacoma Watershed to the northeast, and the City of Fife to south. Significant navigable waterways in this watershed include the Middle Waterway, Sitcum Waterway, and Blair Waterway, which allow deep-water berthing by shipping vessels, and the Puyallup River. Wapato Creek discharges into the head of the Blair Waterway. Although the Thea Foss and Hylebos Waterways are proximal to the Tideflats waterways, they are connected to neighboring watershed drainage basins and are discussed in other sections.

The Tideflats is zoned for Port Maritime and Industrial uses, which are principally dominated by Port of Tacoma operations, but also include other businesses. The Port of Tacoma supports 24-hour operations to accommodate regional and international shipping and distribution schedules, raw materials processing and manufacturing, transport of raw materials, transport of finished products, and freight mobility infrastructure. The entire area is served by road and rail corridors designed for large, heavy truck, and rail loads.

As a result of the industrial uses, the Commencement Bay Nearshore/Tideflats site was identified by EPA as a Superfund site requiring remediation CERCLA. Within the Tideflats Watershed area, the Middle and Sitcum Waterways were identified as cleanup sites. Sediments in these waterways have undergone remediation under the oversight of EPA with work completed in the Middle Waterway in 2004 and in the Sitcum Waterway in 1994.

Exhibit 24: Land Use Designation within Tideflats Watershed.

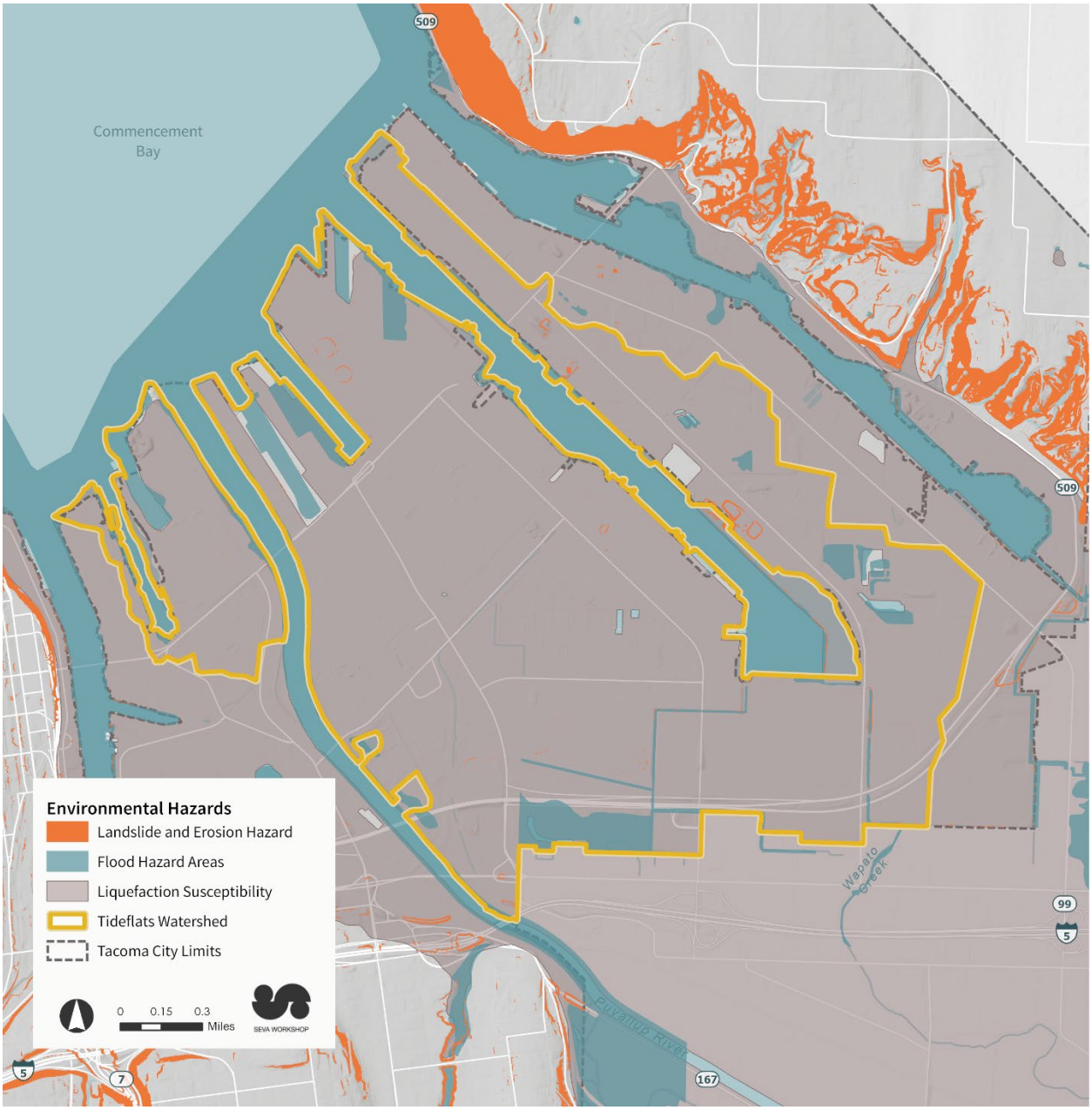


Sources: City of Tacoma (Future Land Use Designation), 2024; Seva Workshop, 2024

Exhibit 25: Environmental Assets, Tideflats Watershed.

Sources: City of Tacoma (*Streams, Wetlands, and Waterways; Aquifer Recharge Areas; Open Space Corridors; Priority Subbasins*) 2024; Washington Department of Fish and Wildlife (*Biodiversity Areas and Wetlands*); Seva Workshop, 2024.

Exhibit 26: Environmental Hazards, Tideflats Watershed.



Sources: City of Tacoma (Landslides and Erosion Hazards; Flood Hazard Areas; Liquefaction Susceptibility) 2024; Seva Workshop, 2024.

Receiving Waterbodies and Stormwater Facilities

Tideflats Watershed Sub-basin

The watershed is divided into six sub-basins, with some sub-basins having more than one marine outfall. Stormwater from this watershed discharges into the Middle, Sitcum, and Blair Waterways, and the Puyallup River. In addition, there are some private discharge points in Wapato Creek.

TF-01 is the western-most of the Tideflat sub-basins and includes a municipal discharge point to the head of the Middle Waterway. A small area of this sub-basin discharges directly to the Puyallup River at East 11th Street. There are several small public ditches and inlets east of East Portland Avenue and north of East 11th Street. that tie to a private system.

TF-02 is located north of Lincoln Avenue with two public outfalls to the Sitcum Waterway located on the east and west sides of the head of that waterway. The western outfall discharges water from Milwaukee Way while the eastern outfall discharges stormwater from the Thorne Road. area, East 11th Street from the Sitcum Waterway to Port of Tacoma Road. and a small portion of Port of Tacoma Road.

TF-03 is the largest of the Tideflats sub-basins and is located south and east of TF-02. The Lincoln Avenue ditch is located in this sub-basin. This combinated piped and ditched system discharges near Port of Tacoma Road into a private conveyance, which then discharges to the Blair Waterway.

TF-04 is located at the south end of the sub-basin. City of Tacoma storm pipes in this area discharge along Port of Tacoma Road into a private system, which then discharges into the head of the Blair Waterway.

TF-05 is also located at the south end of the sub-basin. Wapato Creek is within TF-05.

TF-06 is located on the peninsula between the Blair and Hylebos Waterways. There are four public discharge points to the east side of the Blair Waterway in addition to several private discharge points.

Puyallup River

Information on the Puyallup River can be found in the Lower Puyallup Watershed Section.

Blair Waterway

The Blair Waterway is an industrial and commercial shipping channel and is dredged periodically to maintain depths for shipping. During pre-dredging testing in 2013, a hazardous substance, tributyltin (TBT), was found in the sediments, which led the Port of Tacoma to enter into a settlement agreement with the EPA to remove these contaminated sediments.

There are four City-owned outfalls and at least 19 private and Port-owned outfalls discharging to the Blair Waterway.

Sitcum Waterway

The Sitcum Waterway, an industrial and commercial shipping channel, was identified as one of the areas of contamination as part of the Commencement Bay Nearshore/Tideflats Superfund site. The waterway was remediated in 1994. There are two City-owned outfalls and several Port of Tacoma outfalls that discharge to the Sitcum Waterway.

Middle Waterway

The Middle Waterway contains one of the last remnant mudflats in the tideflats area. The waterway is an industrial and commercial shipping channel and was identified as a remediation site as part of the Commencement Bay Nearshore/Tideflats Superfund site. The waterway remediation was completed in 2004.

Significant habitat restoration has occurred in this waterway along the entire eastern shoreline of the waterway, around the head of the waterway, and along the southern half of the western shoreline. In the outer portion of the western shoreline, industrial uses remain. There is one City-owned outfall to the head of the Middle Waterway, as well as several small private outfalls.

Wapato Creek

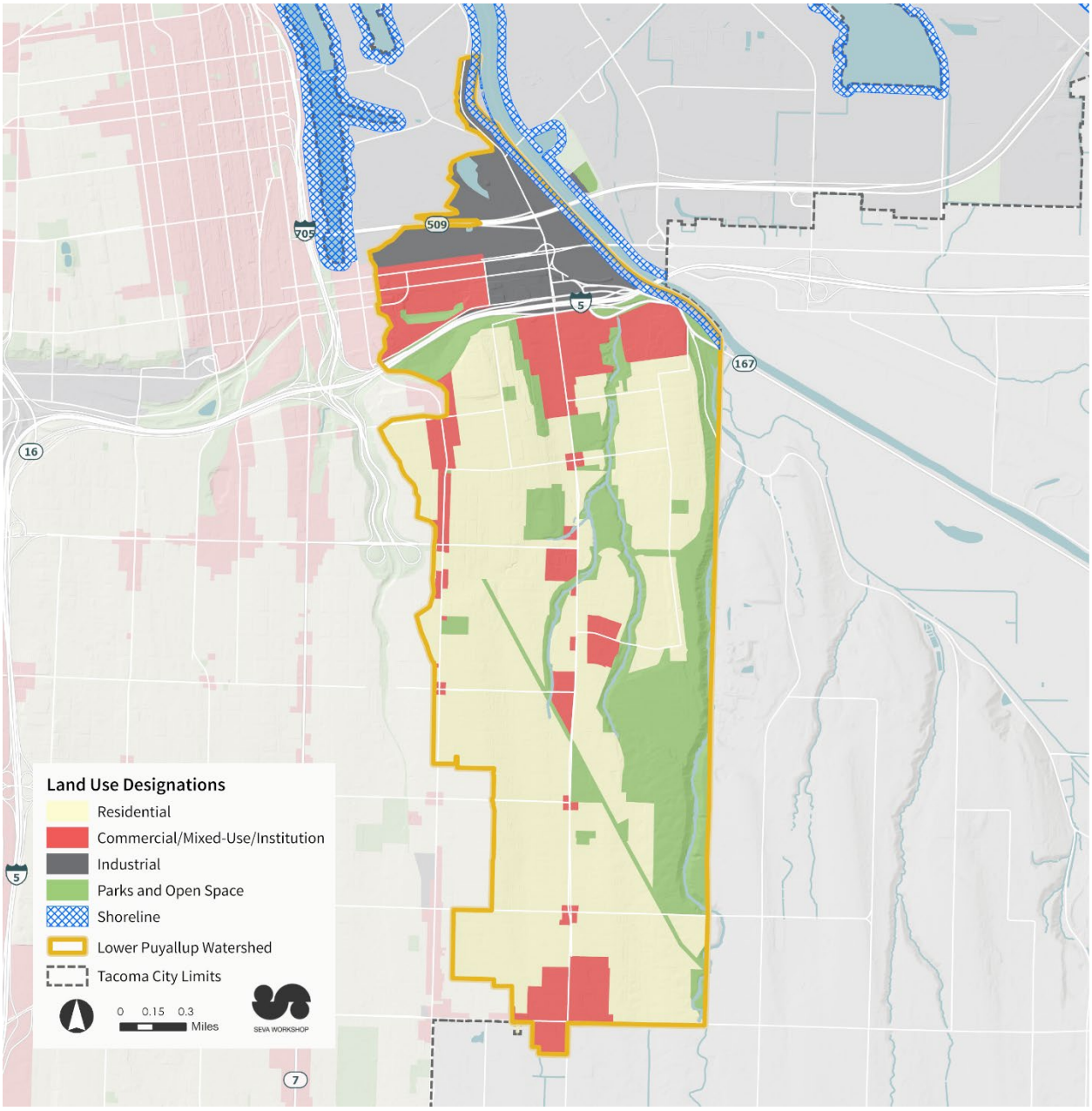
The habitat in Wapato Creek, and specifically the instream flow is listed in Category 4C (impaired by a non-pollutant) for inadequate instream flow. In addition, the water in the creek is listed as Category 5 for bacteria and dissolved oxygen based on data received from the Puyallup Tribe of Indians indicating that a TMDL or other approved water quality improvement project is required for the water bodies. Wapato Creek was also listed as Category 2 for benzene.

Lower Puyallup

The Lower Puyallup Watershed in Tacoma drains the lower reaches of the Puyallup River Watershed, discharging to what was historically the Puyallup River Estuary. The Lower Puyallup Watershed is located in the southeast portion of Tacoma and borders the Thea Foss Waterway Watershed, the Tideflats Watershed, Pierce County, and the Puyallup River. Significant water bodies within the Lower Puyallup Watershed include the Puyallup River, Swan Creek, and First Creek, which are part of the larger WRIA-10 Puyallup-White Watershed.

The Lower Puyallup watershed covers 2,982 acres, with 939 acres of impervious surface. At present, portions of the watershed are predominately residential with some undeveloped open space and a few small commercial areas while industrial activity dominates the former estuary now identified as the Tideflats.

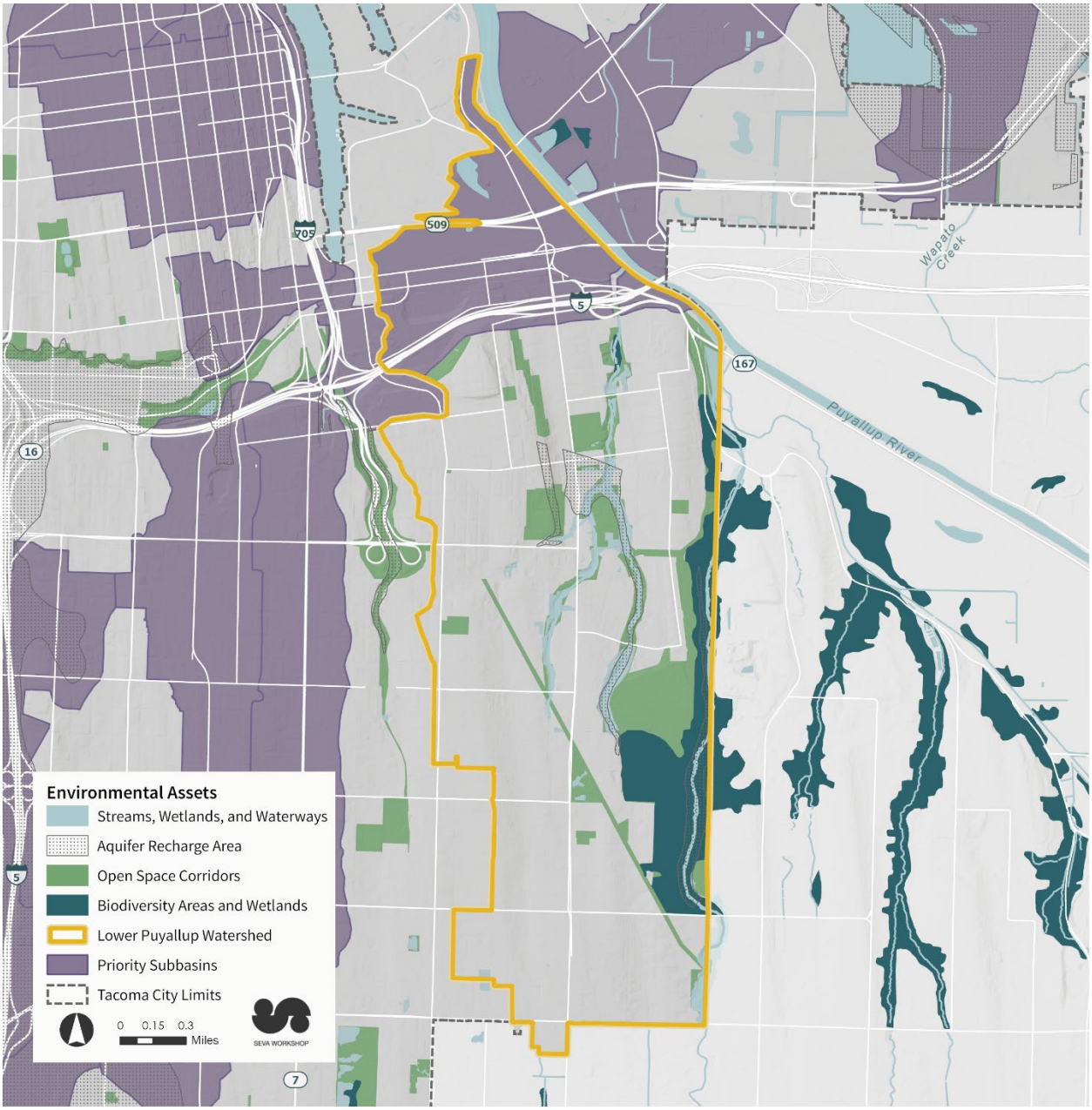
Exhibit 27: Land Use Designation within Lower Puyallup Watershed.



Sources: City of Tacoma (Future Land Use Designation), 2024; Seva Workshop, 2024

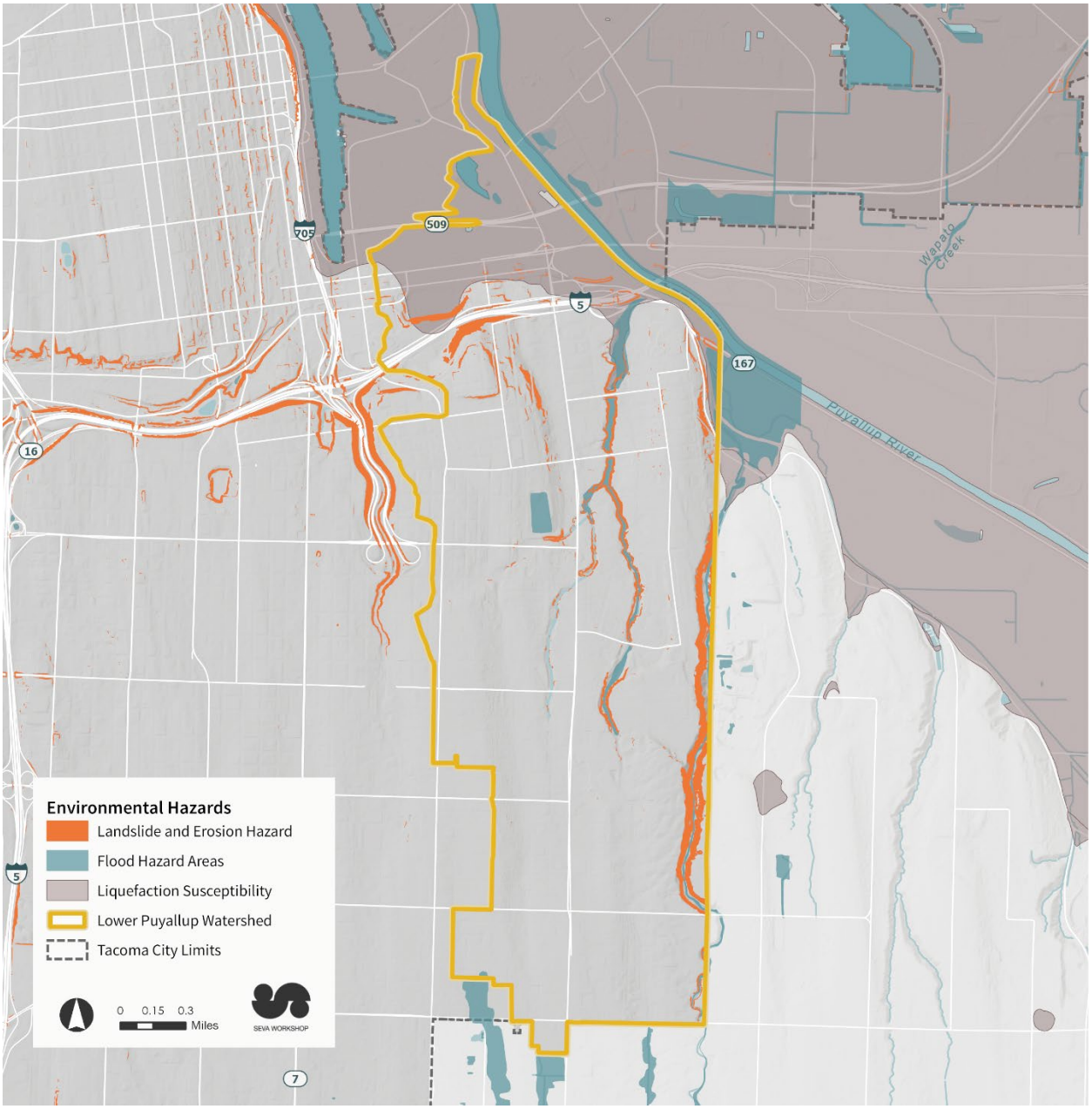
The lower reaches of the Puyallup River were historically straightened with levees due to extensive flooding. The estuary was filled and dredged to create property for industrial activities and navigable waterways for use by the Port of Tacoma. In recent years, there has been a noticeable increase in dumping debris and human waste associated with homeless encampments in the First Creek area, which creates a human health risk, degrades water quality, and interferes with needed utility maintenance activities.

Exhibit 28: Environmental Assets, Lower Puyallup Watershed.



Sources: City of Tacoma (*Streams, Wetlands, and Waterways; Aquifer Recharge Areas; Open Space Corridors; Priority Subbasins*) 2024; Washington Department of Fish and Wildlife (*Biodiversity Areas and Wetlands*); Seva Workshop, 2024.

Exhibit 29: Environmental Hazards, Lower Puyallup Watershed.



Sources: City of Tacoma (Landslides and Erosion Hazards; Flood Hazard Areas; Liquefaction Susceptibility) 2024; Seva Workshop, 2024.

Receiving Waterbodies and Stormwater Facilities

First Creek

First Creek is a perennial stream flowing north towards the Puyallup River. First Creek is a non-fish bearing stream and has areas with perennial flow and seasonal flow. First Creek consists of the main channel, located west of East T Street, and two tributaries: the West Tributary and the "West-West" Tributary. All three channels of First Creek are largely located in 20- to 30-foot-deep ravines. The creek system includes several associated wetlands as well as a number of wildlife species and habitats. Historically, First Creek likely contained a hydrological connection to the Puyallup River and was accessible to fish. However, during the development of the City, a large portion of First Creek was piped, which eliminated any potential fish access. Although threatened, endangered, sensitive and candidate species have not been observed in the First Creek system in recent years, the creek system is regulated by the City of Tacoma Critical Areas Preservation Ordinance (CAPO) and other state and federal agencies.

The First Creek drainage basin encompasses approximately 2,500 acres of residential and commercial area. The majority of the basin is within the City of Tacoma and approximately 600 acres lie within unincorporated Pierce County. The First Creek corridor is bordered by residential development, two schools, Portland Avenue Park and The Puyallup Tribe of Indians Emerald Queen Casino. A significant portion of the corridor is within the Puyallup Reservation lands. Several City roads cross the creek, including Fairbanks Street, E 34th Street, and other key arterial roadways.

First Creek and its tributaries contain stormwater and sanitary conveyance pipes, manholes, stormwater outfalls, and several utility access roads managed by the Environmental Services Department (ESD). In the 1990s, ESD completed channel modifications to control erosion, which included rock armoring and piping to prevent channel erosion in the lower gulch. It has been estimated that 70 percent of the stream channel has been armored to reduce erosion. Approximately 60 percent of the stormwater system in the gulch is open channel, and roughly 40 percent is piped. While these stormwater system modifications within the gulch were necessary to address erosion concerns, these changes may have affected habitat conditions in First Creek. The First Creek outfall receives stormwater runoff from the east side of the Lower Puyallup Watershed, which is primarily residential with some commercial land use. This includes stormwater discharging from the Tacoma Dome, Portland Avenue, First Creek neighborhood, and the Salishan affordable and sustainable housing development.

Cleveland Way Pump Station

The Cleveland Way Pump Station is located west of the Cleveland Way right-of-way, immediately south of the Puyallup Avenue Bridge and receives stormwater discharges from the northern industrial/commercial area of the watershed, including stormwater draining from the City's Central Wastewater Treatment Plant. The Cleveland Way Pump Station was designed and constructed in the early 1960s to pump the stormwater to a high enough grade to discharge to the Puyallup River. Flow from the overflow structure (manhole 6777476) is conveyed north to

the First Creek Outfall except during high flow conditions when it is diverted west to the ditch on E 29th and then the Cleveland Way Pump Station.

Due to outdated mechanical equipment and flooding concerns, the City upgraded the pump station in 2015. While the system was not designed to reduce sediment loading to the Puyallup River, the system acts like a sediment trap and needs to be periodically cleaned of sediment and debris. Since the installation and upgrade of the higher capacity pumps, flooding has not been a concern in this area.

Puyallup River

The Puyallup River is the largest river in Tacoma and a regionally significant waterway in South Puget Sound. The river along with its tributaries serve as major migration routes for a variety of salmonids, including Spring Chinook and bull trout, which have both been listed as endangered species. There are four fish hatcheries located in this system upstream of Tacoma.

The associated drainage basin occupies approximately 1,065 square miles in the Puget Lowlands. Its two major tributaries are the White and Carbon Rivers. The lower portion of the river from its mouth to approximately two miles upstream is located within the City of Tacoma. The lower Puyallup at Commencement Bay is a salt-wedge estuary, with deeper marine water overlain by a layer of fresh water. Centuries of urbanization has extensively modified the estuary. Below River Mile 2.0 in the Tideflats Watershed, industrial activity is the dominant land use and 99 percent of the estuarine wetland has been lost.

The Puyallup River is listed as impaired (303d list) for fecal coliform and subject to a fecal coliform TMDL. Upstream tributaries in other jurisdictions are noted as needing a reduction in fecal coliform bacteria loading. There is a load allocation monitoring point at the Lincoln Avenue Bridge crossing, but Tacoma has not been identified as contributing to any water quality violations in this area.

Recent habitat restoration efforts completed with efforts of the Puyallup Tribe of Indians, the Port of Tacoma, the City of Tacoma, and others have resulted in increased wetland acreage including a project at the Simpson Pulp Mill site and the creation of the Gog-le-hi-te wetland located near the mouth of the river on the east side across from the City's main wastewater treatment plant. As part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project habitat mitigations sites were constructed along other waterways within the Puyallup River Watershed. The Puyallup River Side Channel Project provides off-channel habitat intended for use by juvenile salmonids for rearing and refuge during their outward migration to the Puget Sound. The project merged an existing isolated wetland and excavated an adjacent parcel, creating an off-channel habitat area. The existing flood control levee structure was breached following construction of a new levee to allow the river and associated tidal hydrology to enter.

Swan Creek

Swan Creek is a moderate sized tributary located within the larger Clear Creek basin. Swan Creek originates in Pierce County south of Highway 512. It flows north towards the Puyallup

River and along the City of Tacoma-Pierce County boundary. Swan Creek eventually flows into Clear Creek, which then flows into the Puyallup River.

The Swan Creek basin drains mostly residential neighborhoods and open spaces including Swan Creek Park with a drainage basin of about four square miles. Most of the drainage area is located in unincorporated Pierce County. A small portion of the basin lies along the City of Tacoma's eastern border. Much of the land located within the lower portion of the drainage basin is located within Swan Creek Park, which is owned and operated by Metro Parks Tacoma.

Chum salmon and cutthroat trout are the most common species present, with chum spawning in the lower creek. Swan Creek has a B-IBI score classified as poor (average of 21 between 2001 and 2009). Swan Creek is listed as impaired (303 d list) for fecal coliform. In the Puyallup River fecal coliform TMDL, the creek is noted as needing a reduction in fecal coliform bacteria loading. The City restored a large habitat site near the mouth of Swan Creek through the NRDA Consent Decree. A recently completed fish barrier removal project by Tacoma Public Utilities is also helping to open the creek for salmon use. Stream Team volunteers monitor water quality in Swan Creek for the City. An annual Salmon Homecoming celebration is also hosted at Swan Creek to increase community awareness of this valuable resource.

ESA Listed Fish Species Critical Habitat

Foss Waterway, Commencement Bay, and the South-Central Puget Sound are rearing and migratory areas for several fish populations. The Puyallup River, which also discharges into Commencement Bay within 1 mile of the waterway, has seven fish populations including:

- Coho, documented presence and rearing
- Spring and Fall Chinook, documented presence and rearing
- Fall Chum, documented presence
- Winter Steelhead, documented presence
- Sockeye, documented presence
- Pink Salmon (odd year), documented presence
- Bull Trout, documented presence

The WDFW's listed fish population for the Puyallup-White Watershed are:

Population Name	Species	Federal Status
White River (Puyallup) Bull Trout	Bull Trout	Threatened
Puyallup Chinook	Chinook	Threatened
White River Chinook	Chinook	Threatened

Puyallup/Carbon Winter Steelhead	Steelhead	Threatened
White River (Puyallup) Winter Steelhead	Steelhead	Threatened
Fennel Creek Fall Chum	Chum	Not Warranted
Hylebos Creek Fall Chum	Chum	Not Warranted
Puyallup/Carbon Fall Chum	Chum	Not Warranted
Puyallup Coho	Coho	Not Warranted
White River (Puyallup) Coho	Coho	Not Warranted
Puyallup Coastal Cutthroat	Cutthroat	Not Warranted
Puyallup Pink	Pink	Not Warranted

Source: City of Tacoma, 2024

Western Slopes

The Western Slopes Watershed covers 2,090 acres and is the only Tacoma watershed that drains to the Narrows Passage. The watershed is also part of WRIA-12 Chambers-Clover Creek Watershed. The watershed is predominately residential with many steep slopes that contain underground springs and near surface groundwater. The Burlington Northern Sante Fe (BNSF) railway system runs along the entire length of the waterfront along the base of the steep slope areas. Many culverts have been placed under the tracks to collect and convey the stormwater runoff; the creek flows under the tracks to the Puget Sound.

Exhibit 30: Land Use Designation within Western Slopes Watershed.

Sources: City of Tacoma (Future Land Use Designation), 2024; Seva Workshop, 2024

Multiple short creeks are present along the slopes in this area. Significant creeks identified in the 2000 Tacoma Urban Creek Assessment Report include Gold Creek, Narrows Creek, Crystal Creek, Crystal Springs Creek, Marinera Creek and Titlow Park Gulch Creek. There are additional gulch systems that contain very little flow.

The Western Slopes forms a green belt between Point Defiance Park and Titlow Beach. This wildlife migration corridor is of great importance in Tacoma. Evidence of a large deer population

as well as raccoons, river otter, and other small animals are present along this corridor. Critical habitat issues in this watershed include development near steep slopes and the removal or topping of trees to enhance views to the Puget Sound.

Exhibit 31: Environmental Assets, Western Slopes Watershed.

Sources: City of Tacoma (*Streams, Wetlands, and Waterways; Aquifer Recharge Areas; Open Space Corridors*) 2024; Washington Department of Fish and Wildlife (*Biodiversity Areas and Wetlands*); Seva Workshop, 2024.

Exhibit 32: Environmental Hazards, Western Slopes Watershed.

Sources: City of Tacoma (Landslides and Erosion Hazards; Flood Hazard Areas; Liquefaction Susceptibility) 2024; Seva Workshop, 2024.

Receiving Waterbodies and Stormwater Facilities

Western Slopes Sub-basins

There are four distinct sub-basins in the Western Slopes Watershed discharging stormwater to the Narrows Waterway. The northern most sub-basin (WS01) discharges stormwater from the

western portion of Point Defiance and the residential neighborhoods between Pearl Street and the Narrows. There are several small gulches in this sub-basin.

The WS02 is a small sub-basin discharging stormwater from a residential area along North Narrows Drive between North Mildred and North 17th Streets. The gulch systems draining this sub-basin area include Stormwater Pipe Alley, Deer Haven Gulch, Chinese Mining Gulch, and Jason's Gulch.

The WS03 sub-basin is the largest sub-basin in this watershed and receives discharges from both residential and commercial areas as well as Highway 16. The gulches in this system include Water Memorial Park Gulch, Tacoma Outboarder Association (TOA) Gulch, and the Pedestrian Bridge Gulch. This sub-basin also includes Narrows Creek.

The WS04 sub-basin is the southernmost basin in this watershed and borders University Place. This sub-basin receives stormwater discharges from areas with both residential and commercial development. The basin also includes most of Titlow Park and Titlow Park Gulch, Crystal Springs Creek, and Crystal Creek, which collects and conveys through the Day Island Marina storm system at the end of S. 19th Street. Stormwater runoff from a significant area of commercial and residential development in University Place drains north; it also is collected and conveyed by the City stormwater system in S. 19th Street.

Tacoma Narrows

The Narrows is a strait that is part of the Puget Sound, separating the Kitsap Peninsula from the City of Tacoma and separates the South Sound from the Main Basin. Due to the large tidal exchange and the narrow passage, the strongest currents in the Narrows can reach up to 5 knots. The Narrows is currently listed as a Category 5 on the 303d list for dissolved oxygen.

Marinera Stream

This stream and gulch runs parallel to the south of Marinera Street, just north of Gold Creek Gulch. Access to this a small gulch can be found at the end of Marinera Street or from the Vassault Park trail. There is a 10-inch stormwater pipe that drains Marinera Street. According to the Urban Creek Study, there is a possibility that the stream is fish accessible when the culvert is submerged during high tide.

Narrows Creek

Narrows Creek originates at Jackson Avenue and Highway 16 off-ramp intersection. The creek parallels Highway 16 and slopes into the stormwater inlet structure behind the closed Western Slopes Treatment Plant. The large gulch system is accessible from the entrance to the old treatment plant. There are impassable fish barriers including a trash rack on the storm line and a long culvert from the stormwater inlet structure to the outfall discharging to Puget Sound.

Titlow Park Lagoon and Beach

Titlow Park is the only beachfront park on the west side of Tacoma. The park contains a large 75-acre grassy and forested open space located at the base of 6th Avenue. The park contains marine shoreline, 25 freshwater wetlands, and four forested perennial streams: Titlow Park Creek, Crystal Springs Creek, Pedestrian Bridge Gulch, and Tacoma Outboarder Association (TOA) Gulch. The mature forest in the area provide beneficial wildlife habitat for birds, fish, and other wildlife.

Currently, the Titlow Lagoon is connected to the Puget Sound through two 40-inch culverts that pass under the BNSF railroad. A railroad bridge is being proposed to replace the culverts and allow open access from nearshore habitat to the lagoon. The City is investigating the potential for a regional stormwater treatment facility located in the park, which would treat the stormwater discharging into the lagoon. Titlow Park Creek begins in a ditch on Sunset Drive, travels through a residential area, and crosses 6th Avenue where it enters Titlow Park. The creek discharges to Upper Titlow Lagoon.

Crystal Springs Creek is a highly urbanized stream and its receiving water contain many culverts, channelized reaches through residential backyards, and other fish barriers along the length of the creek. Crystal Springs Creek headwaters are in University Place at approximately 22nd St. Ct. W and Crystal Springs Road. Crystal Springs Creek enters the stormwater system at the top of Titlow Road, where stormwater and creek flow are co-mingled. Crystal Spring Creek discharges to the Narrows and Lower Titlow Lagoon.

Pedestrian Bridge Gulch is a small creek located west of Narrow's Glen Retirement Center near 6th Avenue and Laurel Lane. Due to the steep gradient, culvert barrier under the railroad tracks, and low flows, this creek is not accessible to fish.

The creek associated with the TOA Gulch is located north of Pedestrian Bridge Gulch and west of Sunset Drive. Similar to Pedestrian Bridge Gulch, due to the culvert under the railroad tracks and low flows, there is small possibility that this stream is accessible to fish. There are no stormwater pipes draining into this gulch.

1.4 Habitat Restoration

Habitat restoration is a purposeful effort by people to reestablish ecological functions in an area where ecological functions were degraded, impaired, or lost because of industrialization, population growth and/or development. Tacoma is a highly urbanized city with most of the ecosystems and natural processes that were present historically eliminated or significantly altered due to urbanization. Habitat restoration efforts in Tacoma aim to restore valuable ecological functions to benefit the environment, wildlife and people; and to create a more climate resilient community.

There are many types of restoration projects. Restoration projects vary by the group or organization performing the work, future land use planned for the restoration site, the type of habitat or function being restored, permitting complexity, the amount of work needed to

complete the project, and other factors. Restoration of wetlands and riparian habitats are often prioritized because these habitats provide gains in ecologic functions and values. Restoration projects in Tacoma can be categorized as follows:

- Natural Resource Damage Assessment and Restoration Habitat Sites
- Commencement Bay Natural Resource Trustees Sites
- The Foss Waterway Cleanup Habitat Mitigation Sites
- Port of Tacoma Habitat Sites
- Compensatory Mitigation Sites
- Metro Parks Tacoma Projects

1.5 Critical Areas

Critical areas, as defined by the Growth Management Act, include wetlands, critical aquifer recharge areas, frequently flooded areas, geologically hazardous areas, and fish and wildlife conservation areas. They are briefly characterized below. Descriptions and accompanying figures indicate the general locations of these features in Tacoma. Figure 2 and Figure 3 show the location of known critical areas.

Critical areas provide many important functions and protect communities from hazards. The functions mentioned in this section, and detailed further in the Best Available Science (BAS) Review report (Facet 2024) tend to focus on ecosystem processes and services. However, critical areas also provide social, cultural, and economic benefits including recreational and educational opportunities, and aesthetic value. For more information on the functions, values, anticipated climate change impacts, and protection mechanisms for critical areas, refer to the Best Available Science Review report (Facet 2024).

Critical Aquifer Recharge Areas

Critical aquifer recharge areas are areas with a recharging effect on aquifers used for drinking water. Aquifers also discharge groundwater to wetlands and streams. This groundwater helps maintain base stream flows during the dry season. The Central Pierce County Aquifer Area is a large groundwater resource area which encompasses central Pierce County, areas to the south and west of Tacoma and extends into Tacoma city limits, most notably in the South Tacoma area.

Numerous individual and public water systems in Pierce County, including the City of Tacoma, use this aquifer as a water supply. Therefore, protection of both the quantity and quality of this aquifer is imperative. The Central Pierce County Aquifer Area supplies Tacoma with approximately five percent of the City's annual water requirements[8].

[8] Source: https://www.mytpu.org/about-tpu/services/water/water-source/ground-water-wells/

Groundwater and surface water interact through recharge, storage, and discharge. Aquifers support aquatic resources like streams and wetlands. In addition to potable water uses, the City is required to manage and balance groundwater use to support and maintain adequate stream flow for anadromous fish (Streamflow Restoration Act RCW 90.94).

Climate change will continue to impact water resources in Tacoma, led by changes to the timing and quantity of precipitation and snow accumulation in the Cascade mountains, soil moisture, and streamflow. Changes in water availability in turn will impact all resources that rely on surface water for recharge such as aquifer recharge areas. In general, higher temperatures will likely cause an increasing portion of precipitation to fall as rain rather than snow, resulting in continued decreases in spring snowpack and earlier snowmelt to west side rivers. The frequency and intensity of extreme precipitation events, like atmospheric rivers, are projected to increase. At this time, it is unknown if these changes will have any effect on the City's drinking water supply.

Fish and Wildlife Habitat Conservation Areas

Fish and wildlife habitat conservation areas (FWHCAs) include lands and waters necessary to support viable populations of fish and wildlife species within their natural ranges. They occur where endangered, threatened, and sensitive species have a primary association with habitat. FWHCAs also include important habitats, regardless of species' use, like streams, ponds, and Oregon white oak woodlands. Major streams and other waterbodies in Tacoma, which are types of FWHCAs, are described under Watersheds.

Notable FWHCAs present in Tacoma include the Puyallup River and other streams; habitat contained within the Puget Sound waters adjacent to the City; Point Defiance Park; and forested steep slopes and bluffs that meet the classification of Biodiversity Areas and Corridors. Urban development has severely reduced the quantity and quality of habitat available for wildlife use in the City. Preservation of FWHCAs is important for protecting sensitive species and Tacoma's remaining high-value habitat patches.

The changing climate affects fish and wildlife habitats in many ways including changes in water availability, temperature, and precipitation that affect forest species composition and overall plant assemblages, growing season for some plants, and the volume and timing of stream flows and stream temperatures. Among other effects, these changes are expected to affect the habitat needs of aquatic species and alter the timing of migration for some salmonid species (Snover et al. 2013). Sea level rise, saltwater intrusion, habitat loss and modification, the spread of pests and invasive species, and loss of biodiversity are collectively projected to negatively impact FWHCAs due to climate change (Sattar et al. 2021).

Wetlands

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration to support a prevalence of vegetation typically adapted for life in saturated soil

conditions. Wetlands are often found near small lakes, ponds, streams, and wet meadows. They include swamps, marshes, bogs, and estuaries.

Wetlands are productive biological systems and provide numerous ecological functions. Wetland functions can be grouped into the following categories: improving water quality, hydrologic functions, and functions related to wildlife habitat. Wetlands can slow or retain stormwater runoff which can reduce downstream erosion potential and help recharge groundwater supplies. Wetlands desynchronize surface water flows by retaining and slowly releasing surface and groundwater. Wetlands function naturally to improve water quality by filtering out sediments, using excess nutrients, and breaking down some toxic chemicals.

Historically, Tacoma contained many more wetlands than are present today. Many of Tacoma's wetlands were filled and developed for commercial, industrial or residential land uses prior to the adoption of regulations that now protect these important natural areas. Current wetland areas in Tacoma are scattered throughout the city. North and west of Downtown Tacoma, remaining wetland areas are generally confined to undeveloped vegetated slopes and ravines, parks (e.g., China Lake Park and Snake Lake Park), and the Tacoma Community College campus. In East Tacoma and South Tacoma, wetlands are present in the vicinity of First Creek and Swan Creek, at Wapato Lake and Charlotte's Blueberry Park, and in small, isolated patches in residential neighborhoods. Similarly, wetland patches are interspersed across the Tideflats area and in Northeast Tacoma, mainly along the steep slopes facing the sound. The wetland patches in the Tideflats area include several wetland restoration sites (see Habitat Restoration).

Climate change is projected to increase frequency and intensity of extreme weather evens and shift seasonal weather patterns. Wetlands are vulnerable to these changes. Watershed scale changes, such as reduced snowpack and the altered runoff timing can impact wetland hydroperiods. Changes in timing and depths of wetland inundation are projected to stress established vegetation and wetland-dependent wildlife.[9] Coastal wetlands are under additional risk from increased inundation and erosion due to sea level rise, which are expected to cause habitat loss and shifts in habitat types (NRC, 2012).

Geologically Hazardous Areas

Geologically hazardous areas are areas that are susceptible to erosion, sliding, earthquake, or other geological events. They are regulated to protect public health and safety. The geologically hazardous area designations present in Tacoma include the following:

- Landslide hazard areas: areas potentially subject to landslides based on a combination of geologic, topographic, and hydrologic factors such as the type of bedrock, soil, slope, slope aspect, structure, or hydrology.
- Erosion hazard areas: areas where the combination of slope and soil type makes the area susceptible to erosion.

[9] Source: https://ecology.wa.gov/water-shorelines/wetlands/tools-resources/wetlands-climate-change

- Seismic hazard areas: areas subject to severe risk of damage as a result of earthquake induced ground shaking, slope failure, settlement, soil liquefaction, debris flows, lahars, or tsunamis.

Landslide and erosion hazard areas occur throughout the city, primarily where steep slopes are present. They are mapped along much of the Puget Sound shoreline, along stream corridors and in limited pockets throughout the city.

High liquefaction susceptibility, areas likely to be inundated from modeled tsunamis, and lahar hazard zones—all types of seismic hazard areas—are located along the Puget Sound shoreline and Puyallup River Valley, overlapping the Port of Tacoma and Tacoma's largely industrial Tideflats Subarea.

Climate change is expected to increase frequency and intensity of extreme rainfall events and raise sea level, both of which could cause an increase in potential landslides in Tacoma. Increased rainfall intensity could also make erosion-sensitive areas more susceptible to erosion. Extreme heat and precipitation changes are also expected to stress plants and cause mortality of some vegetation currently contributing to slope stability.

Flood Hazard Areas

Flood hazard areas generally include lands within the 100-year floodplain and other areas susceptible to flooding from high groundwater. Consideration for these areas is important for minimizing adverse impact to public health, safety, and public infrastructure. Frequently flooded areas also provide important habitat functions for fish and wildlife.

Tacoma's flood hazard areas are located along Puget Sound shorelines, the waterways within the Tideflats Subarea including the Puyallup River, streams that flow to the Tideflats Subarea (i.e., Swan Creek, First Creek, Wapato Creek, Hylebos Creek), and relatively isolated patches located in Central and South Tacoma (e.g., China Lake, South Tacoma Swamp, Snake Lake, Wapato Lake).

Climate change is expected to increase the risk of flooding which will increase the chance of damage to infrastructure located in or near current floodplains. For coastal areas, such as Commencement Bay and Puget Sound, sea level rise will exacerbate these risks. Direct impacts may increase storm surge resulting in temporary flooding of low-lying areas.

Mineral Resource Lands

Mineral resources in Tacoma consist of rock and gravel deposits. These resources support industries that are an important part of Tacoma's economy, providing jobs and needed products for local use and export.

1.6 Open Space

Open space lands in Tacoma provide multiple benefits contributing to a complete and livable urban environment. Benefits of having open space lands include:

- Habitat value for rare or endangered species
- Opportunity for low-impact recreation (such as bird and wildlife observation) and community stewardship
- Increased property values
- Heightened sense of community ownership and recognized value
- Stormwater retention and treatment
- Increased air and water quality
- Aesthetic relief from an urbanized environment
- Improved public health as a result of better air and water quality and opportunities for a more active lifestyle

These benefits are often referred to as “ecosystem services.” Without functional and healthy habitat areas, benefits would not be available or would have to be provided by human intervention. There are a wide variety of open space lands in Tacoma including:

- Parks and recreational lands with active uses like trails and viewpoints
- Natural areas regulated under the City’s CAPO
- WDFW priority habitats and/or biodiversity corridors
- Areas used for the conservation of plant and animal life, including habitat for fish and wildlife species
- Areas used for ecologic and other scientific study purposes
- Areas of outstanding scenic, historic, cultural, scientific, and/or educational value
- Areas providing a natural separation or buffer between land-uses
- Rivers, streams, wetlands, bays, and estuaries
- Forested areas, oak woodlands, and meadows
- Areas providing important habitat connectivity, including utility easements and unimproved rights-of-way
- Marine beaches, lake shores, banks of rivers and streams, and watershed lands

The City of Tacoma classifies its types of open spaces into two categories: active and passive.[10]

- Active parks and open spaces, like playgrounds, playfields, waterfront areas, and nature centers, have developed amenities and features for formal active use. The **Parks and Recreation Element** discusses active open spaces in greater detail.
- Passive open spaces are typically undeveloped lands with vegetation and other natural features such as wetlands, rivers, and streams.

[10] City of Tacoma, Environmental Services Department, Strategic 20-Year Passive Open Space Plan, January 2017

Tacoma Metro Parks properties and recreational facilities provide many opportunities for outdoor activities in the urban landscape. The Metro Parks Strategic Master Plan has identified a “10-minute walk” level of service intending to provide Tacomans with easy access to nearby parks. Additionally, many of Tacoma’s shoreline waterfront areas offer public access to further recreational opportunities and enhance the City’s livability.

Historically, Tacoma’s unique passive open space areas, characterized by wetlands, buffers, and/or steep and unstable slopes, have remained undeveloped and dedicated to open space. These areas, due to their terrain and lack of development feasibility, are now under threat from increased pressure to infill to meet the demands of population and density increases.

The Critical Areas Preservation Ordinance of the Tacoma Municipal Code (TMC 13.11) guides activities within critical areas (e.g., steep slopes, wetlands, wetland buffers, streams, stream buffers, and biodiversity areas/corridors.). As assessed, 47 percent of the passive open space acreage is considered a “steep” slope. Steep slope areas (≥40 percent slope) have special considerations that must be met before restoration work can begin. Geotechnical study, erosion control, and a detailed landscape management plan must be created and permitted prior to the start of work. Coordinating work along wetlands, streams, and their buffers is crucial to ensure the health of these resources. While some restoration work can occur without a permit, areas greater than 1,000 square feet require a city permit before work can begin. This coordinated approach is important to the success of restoration efforts and the health of these resources.

Many of the functions and values provided by habitat areas depend on connectivity with other habitat areas and habitat quality. Open Space Corridors often contain critical areas such as streams, wetlands, steep slopes, and animal and plant habitats. Thus, there is a strong link between the City’s critical area and open space goals.

Passive open space areas continue to face threats from invasive species, habitat fragmentation, adjacent land impacts, and other influences that prevent native species from regenerating. Active management and restoration are key to maintaining the overall health and ecosystem functions of these passive open space areas.

In the past, many passive open space areas have been neglected and subject to mismanagement. In some areas, historic vegetation management techniques included the topping of trees, which is currently prohibited within critical areas (TMC 13.11.210). This management technique was often used to enhance views and reduce a tree’s height with minimal time or skill. However, this method damages the overall tree canopy as it leads to weaker, dense re-growth and provides opportunities for pathogen and disease entry. This technique is not sustainable or healthy for trees, and where trees are located on a steep slope, these actions increase the likelihood of slope instability by reducing soil binding root mass.

Another critical factor impacting Tacoma’s forested areas is invasive plants. Invasive plants are opportunistic and easily take hold when the ground is disturbed. The dominance of non-native plant species, such as Himalayan blackberry, English ivy, and Scot’s broom, is reported to be a

significant cause of biodiversity loss and ecosystem degradation.[11] These invasive plants lack natural population controls (e.g., predators) and are capable of rapid reproduction; they can quickly blanket the understory and prevent native plants from reseeding/regenerating. The result of invasive plant dominance is the creation of monocultures of invasive plants with little or no native plants in the understory.[12]

Timber trespass is also a challenge. Steep slope vegetation is sometimes illegally removed from City-owned properties to improve views.[13] The policing and enforcement of this activity is difficult, and the tree damage is irreparable in the short term while the safety risk is high. Open spaces experience other undesirable activities like dumping household waste and transient encampments. Often, undesirable activities are seen to decrease by initiating restoration activities and improving the site conditions through increased community involvement. Dumping yard waste and other materials into gulch areas is also frequently noted. It can be problematic on slopes as it adds weight and can cause slope instability and failure.[14] Outreach and education campaigns often minimize these adjacent impacts.

Most of Tacoma's undeveloped open space is clustered on steep slopes and around gulches and often restricts access and use, especially within a stream or wetland buffer or biodiversity corridor under the City's CAPO.[15] In 2014, the City's ESD acquired approximately 520 acres of passive open spaces to manage, maintain, and conduct restoration activities. Exhibit 33 below is a spatial visualization of Tacoma's passive open space sites.

[11] City of Tacoma, Environmental Services Department, Strategic 20-Year Passive Open Space Plan, January 2017

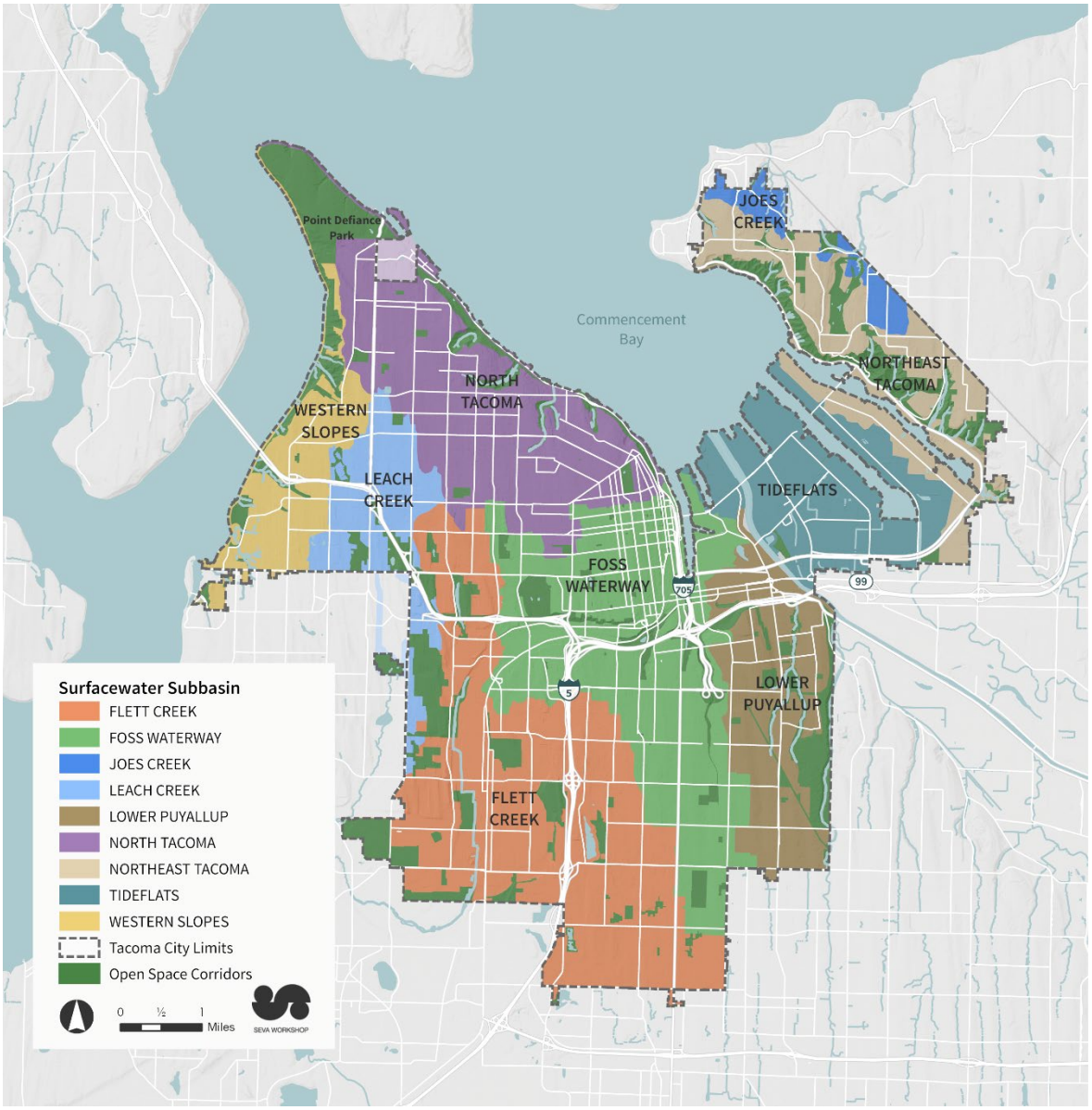
[12] Ibid.

[13] Ibid.

[14] Ibid.

[15] Ibid.

Exhibit 33: Tacoma Passive Open Space and Stormwater Basin Map.



Source: City of Tacoma, Tacoma Urban Forest Plan, 2017.

1.7 Urban Forest

Trees are an integral part of Tacoma's communities and the ecological systems in which they exist. They provide significant economic, social, and environmental benefits, such as carbon sequestration, reduction of the urban heat island effect, energy savings, stormwater runoff reduction, water quality improvement, psychological healing and calming qualities, and increased value of business and residential properties. Planting and maintaining trees help a city become more sustainable and offsets the negative impacts of urban development. Trees

are as necessary as water, infrastructure, and energy to sustain healthy communities. The health of the urban forest is directly linked to the health of the Puget Sound.

Urban forests and forests in developing areas face a unique set of challenges that rural or wilderness forests do not. Unlike a rural forest area, which is often owned by a single owner or a limited number of owners and can be managed through simple single-purpose policies. In contrast, urban forests overlap with a complex set of ownerships, values, and goals. This complexity, coupled with differing maintenance levels and approaches to planting and preservation, requires a multi-faceted approach to the management of the urban forest. Tacoma's urban forest exists on different types of property that are managed differently depending on ownership (public vs. private), uses (commercial, residential, industrial, open spaces, etc.), and the vegetation present (invasive, native, climate-adapted).

Climate change is a significant factor influencing the structure and function of forest ecosystems. The projected changes in climate may lead to shifts in the species composition of urban forests, with some species being lost or gained depending on their climatic suitability. It is anticipated that periods of drought could increase, potentially affecting the growth, reproduction, and physical location of some species. However, the overall impact of climate change on urban forests in Tacoma is currently unknown. This uncertainty underscores the need for proactive planning and management to ensure the resilience and health of the city's urban forest in the face of these challenges.

In city environments, more heat from the sun is absorbed and retained by impervious surfaces. This can intensify temperatures locally, creating health impacts and impacting neighborhood livability. When an area has fewer green spaces and more impervious surfaces like roads, parking lots, buildings, etc., it absorbs and retains more heat from the sun and can create a heat island. The urban heat island effect is a phenomenon where built infrastructure in urban areas causes higher temperatures compared to their surroundings. A 2020 analysis by Earth Economics found that neighborhoods in Central and South Tacoma may be as much as 14°F hotter than neighborhoods in North Tacoma, including regional climate effects.[16] Urban heat islands in Tacoma increase maximum temperatures by as much as 6.2°F above the local baseline.[17] According to Tacoma Urban Forestry, higher-opportunity neighborhoods have 15 percent more tree cover than lower-opportunity neighborhoods. Inversely, lower-opportunity neighborhoods have 19 percent more impervious surfaces than higher-opportunity neighborhoods.[18] Further, neighborhoods burdened with the worst extreme heat typically suffer from the worst economic and health inequality. Trees, urban forestry, thoughtful development, and street design are all key tools to mitigate this urban heat island effect and create a more

[16] Urban Heat Island Analysis, Tacoma, Washington 2020, Earth Economics https://cms.cityoftacoma.org/enviro/UrbanForestry/TacomaWA_HeatIslandAnalysis.PDF

[17] Ibid.

[18] City of Tacoma, Urban Forestry, Tacoma Community Forestry: The Intersection of Trees, Equity, and Human Health, September 2024, https://storymaps.arcgis.com/stories/0b0e009ae2bf4fc3850161bfdfce5740

livable city. Exhibit 34 below shares the urban heat index scores by Tacoma neighborhood in comparison to the City-wide average.

Exhibit 34: Urban Heat Island Index by Neighborhood

Neighborhood	Urban Heat Index	Difference from City-wide Average
Central	86.9	0.52
Eastside	87.2	0.81
New Tacoma	86.0	(0.35)
North East	85.8	(0.59)
North End	85.9	(0.53)
South End	86.8	0.38
South Tacoma	86.6	0.18
West End	85.5	(0.87)
Tacoma	**86.4**	

Sources: City of Tacoma, Equity Index 2022, 2020 by block group; Earth Economics

The 2018 Tacoma Urban Tree Canopy Assessment established a baseline for the city's tree canopy. The results of this study indicated that in 2017, the City of Tacoma contained 20 percent urban tree canopy (or 6,406 of the city's 31,607 total acres); 13 percent non-canopy vegetation (4,257 acres); 14 percent soil/dry vegetation (4,469 acres); 52 percent impervious (16,344 acres); and less than 1 percent water (132 acres).[19] Of the city's 80 percent of land area not presently occupied by tree canopy, 13 percent (4,604 acres) was suitable for future tree plantings, and 67 percent (21,006 acres) was unsuitable due to its current land use or other restraint surfaces.[20] Compared to other communities assessed in the Puget Sound Region,

[19] City of Tacoma, Plan-it Geo, Urban Tree Canopy Assessment, December 2018, https://cms.cityoftacoma.org/enviro/UrbanForestry/TreeCanopy/Tacoma_UrbanTreeCanopyReport_2018.PDF

[20] Ibid.

Tacoma has the least amount of tree canopy as a percentage of land cover.[21] The City of Tacoma Urban Forestry team has committed to a goal of increasing this tree canopy cover to 30 percent by 2030. This increase in coverage is crucial for the health and sustainability of Tacoma's urban forest and wellbeing of communities in Tacoma. In an effort to increasing the city's tree canopy, the City developed the Urban Forest Management Plan, which established six strategies to preserve and increase the tree canopy in Tacoma. Changes to existing codes and policies were an identified strategy, resulting in the update of the municipal code in 2023**.** The changes included updating permit requirements for pruning, removing, and planting street trees, updating policies for reviewing public tree pruning requests, establishing the heritage tree program, impositions for penalties for violations, and updating the appeals process for tree permits.[22]

Various incentive programs and community partnerships were formed to help the City and wider Tacoma community reach its goal. First, Tacoma Urban Forestry developed a Tree Planting Priority Tool that utilizes City data to identify areas where tree planting would have the biggest impact.[23] Incentive programs that give free or discounted trees to residents, along with basic care resources, have been established, along with the Community Tree Program, focused on community engagement related to tree planting projects in Tacoma's low opportunity neighborhoods. Considerations for tree preservation have been factored into new housing zoning code amendments to protect older trees, set minimum tree-canopy cover requirements, and requirements related to the fee-in-lieu program.[24] Since the goal was established in 2018, an average of 3,500 trees have been planted annually by six City departments.

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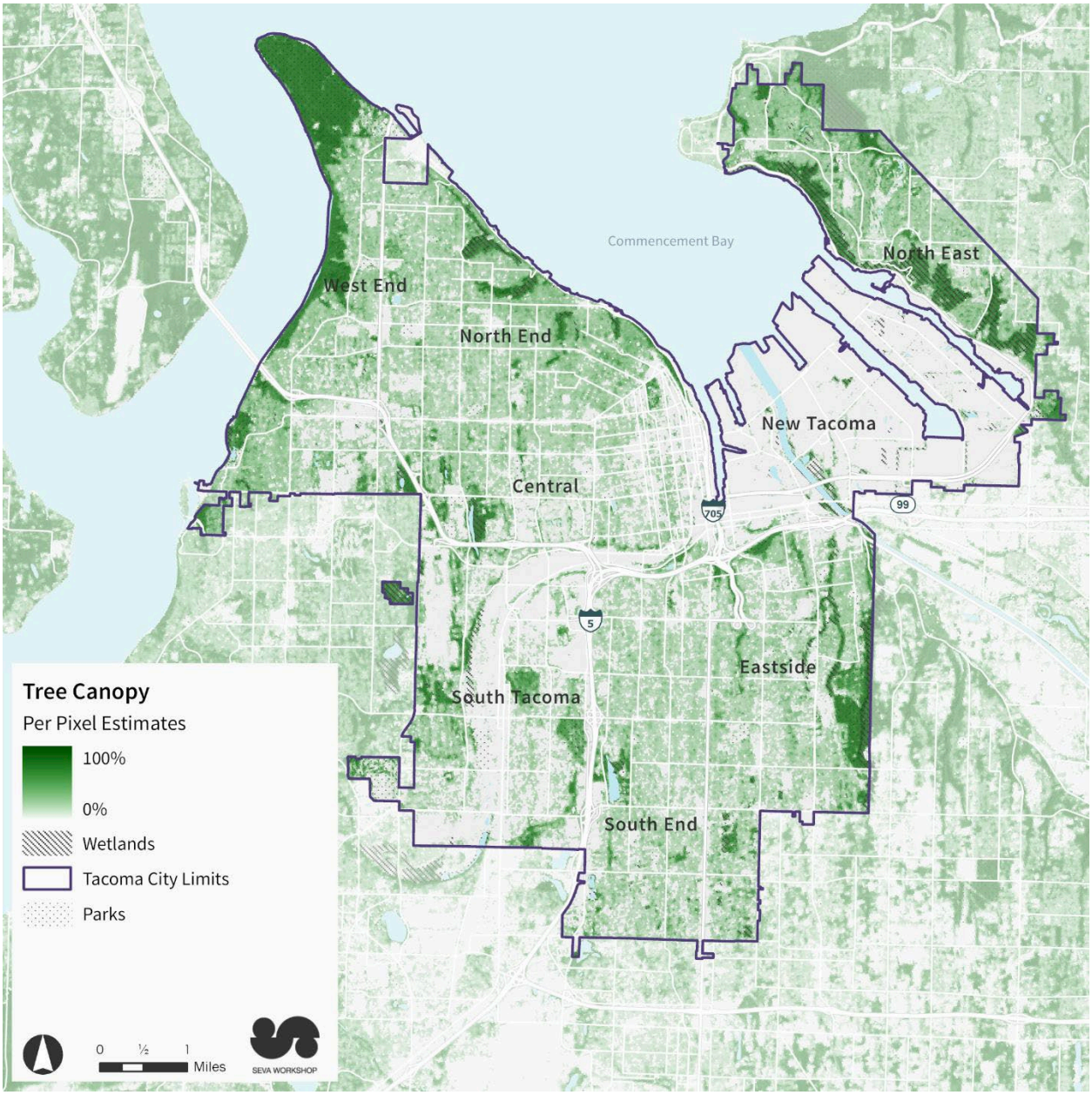
[21] City of Tacoma, Plan-it Geo, Urban Tree Canopy Assessment, December 2018, https://cms.cityoftacoma.org/enviro/UrbanForestry/TreeCanopy/Tacoma_UrbanTreeCanopyReport_2018.PDF

[22] Title 9 – Public Ways, Tacoma Municipal Code, City of Tacoma, June 2024 https://cms.cityoftacoma.org/cityclerk/Files/MunicipalCode/Title09-PublicWays.PDF#page=33

[23] City of Tacoma, Urban Forestry, Tacoma Community Forestry: The Intersection of Trees, Equity, and Human Health, September 2024, https://storymaps.arcgis.com/stories/0b0e009ae2bf4fc3850161bfdfce5740

[24] City of Tacoma, Affordable Housing, Home in Tacoma Project, Landscaping Code Coordination, https://www.cityoftacoma.org/UserFiles/Servers/Server_6/File/cms/Planning/Affordable%20Housing/AHAS%20Planning%20Actions/HIT%20Landscaping%20Code%20Updates%20Analysis.pdf

Exhibit 35: Tacoma Tree Canopy Coverage, 2021.



Sources: USDA Forest Service, 2021 Seva Workshop, 2024.

2 DATA DICTIONARY

Environmental Assets

- **Streams, Wetlands, and Waterways.** City of Tacoma, 2024. One Tacoma Plan Map (web map link)
- **Fish + Wildlife**. WA Department of Fish and Wildlife, 2024. PHS on the Web Map (map link)
  - Note: To match the original map, PHS dataset was filtered to include both Biodiversity Areas and Corridor, as well as Wetlands
- **Aquifer Recharge Area.** City of Tacoma, 2024. One Tacoma Plan Map (web map link)
  - Note: The city included a different aquifer recharge layer with the requested data, which covers the majority of the city, minus most of the North East neighborhood.
- **Open Space Corridor.** City of Tacoma, 2024. Data request
- **Surfacewater Subbasins.** City of Tacoma, 2024. Data request
- **Tree Canopy**. USDA Forest Service, 2021.

Environmental Hazards

- **Landslide and Erosion Hazard.** City of Tacoma, 2024. Data request
- **Flood Hazard Areas.** City of Tacoma, 2024. Data request
- **Liquefaction Susceptibility.** City of Tacoma, 2024. Data request