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TECHNICAL MEMORANDUM

Date:	August 4, 2011
To:	Tom Knuckey
From:	David Dinkuhn, P.E.
Subject:	Existing Conditions Inventory
cc:	Partners
Project Number:	233-1896-096 (01/01)
Project Name:	Gorst Creek Watershed Comprehensive Plan

INTRODUCTION

The Gorst Creek Comprehensive Watershed Plan is a joint effort between the City of Bremerton and Kitsap County, with assistance from the Department of Ecology (DOE), the Department of Fish and Wildlife (WDFW), the Suquamish Tribe, and other stakeholders. The purpose of the comprehensive plan is to provide a platform for responsible development in the largely-undeveloped watershed that will protect and restore ecosystem processes, structures, and functions. The purpose of this technical memorandum is to provide an inventory of the watershed's existing conditions that will be used to inform the planning process.

The inventory is presented graphically on the attached maps. This inventory was developed using existing geographic information system (GIS) data and other supporting information provided by the City of Bremerton, the Washington State Department of Natural Resources (WDNR), Kitsap County, DOE, the Washington State Department of Transportation (WSDOT), WDFW, the Suquamish Tribe, and the National Wetlands Inventory.

PROJECT AREA DESCRIPTION

The project area is located in the City of Bremerton and unincorporated Kitsap County on the western side of Puget Sound, in the central portion of Kitsap County, about 15 miles west of Seattle (Map G-1). The project area lies within Water Resource Inventory Area [WRIA] 15, which encompasses all of Kitsap County and portions of Mason, Pierce, and King Counties (Vashon Island). Bremerton is located in the eastern portion of WRIA 15, or the East Kitsap Watershed, and most of the area is comprised of numerous small drainages flowing directly into Puget Sound.

Watershed Description

The watershed covers approximately 7,000 acres in the southwestern portion of Kitsap County. Approximately 3,000 acres are forest resource land owned by the City of Bremerton, and approximately three percent of the remaining 4,000 acres include commercial, industrial and residential zoned land developed with buildings and other impervious surfaces. The watershed boundary and current zoning are shown on attached Map LU-1. The conditions in the upper Gorst Creek watershed are largely undeveloped, with low levels of impervious surfaces,

and wetland complexes in the headwaters that provide moderate to high functions, including floodwater retention, water quality, and habitat functions (Maps WC-1 through WC-3).

Gorst Creek supports Chinook, chum, coho, steelhead and cutthroat (WDFW 2009; Map FP-1). Gorst Creek is classified by Kitsap County as a Type F (fish-bearing) stream (KCDCD 2011). Thirteen Type F tributary streams including Parish Creek, Heins Creek, and an unnamed stream (LMK 122) are located within the watershed. The upper reaches of these tributaries are of high ecological function and generally undisturbed by development; with the exception of the upper reach of Gorst Creek immediately south of Highway 3. This reach was destroyed in the 1960's when an approximately 720-foot long, 24-inch diameter culvert was placed in the stream channel and backfilled with solid waste to create a landfill. The landfill operated until 1989 when its operating permit was revoked by the Kitsap County Health District (KCHD). The culvert, which is partially crushed, is a fish passage barrier and is identified with the "other" symbol located just south of SR-3 on Map FP-1. Outflow from the culvert typically occurs below grade in the granular stream sediments during low flow periods. The landfill is also the source of known contaminants within the creek (E&E 2004). Total failure of this culvert is anticipated in the short term.

The lower reaches of Gorst Creek are significantly altered by development and highways, with fill in the lower channel, estuary and nearshore, impervious surfaces, water and soil contamination, channel confinement, and tidal restrictions. The floodplain in lower Gorst Creek is mostly hardened and confined. The lower reaches lack riparian vegetation and large woody debris (LWD). A number of culverts/passage barriers affect the lower reaches – including under SR-3 and Old Belfair Highway (Map FP-1). Above SR-3, the channel may have no flow during summer months. Floodwater retention in the watershed is a critical function, due to the history of flooding within the Gorst Creek Drainage Basin (Parametrix 2010).

The City's Gorst Creek Salmon Rearing Facility, jointly operated with the Suquamish Tribe, WDFW, and Kitsap Poggie Club, is located in the watershed. The facility includes two Chinook rearing ponds and two yearling fall Chinook raceways about 0.75 miles upstream from the mouth. All returning adult Chinook are thought to be hatchery fish and not the result of natural production. Gorst Creek is currently one of the largest producers of salmon in Kitsap streams. The facility releases two million Chinook salmon smolts into Gorst Creek, and raises 300,000 Coho salmon smolts for release into Agate Pass annually.

Land cover is forested in the upper watershed, but mixed forest, grasslands, urban residential, or commercial industrial in the lower reaches. Impervious surfaces are high near the lower reaches and mouth of Gorst Creek – mostly greater than 80% to 90% impervious (Map WC-2). Zoning within the watershed is primarily low/medium density and rural residential with smaller areas zoned industrial, urban reserve, high density residential, and transportation/public facilities. Gorst UGA zoning consists of intensive use categories including Highway/Tourist Commercial, Industrial, Urban Restricted, and Mineral Resource.

Gorst Estuary

Gorst estuary provides significant shoreline functions to Sinclair Inlet and Puget Sound. The estuary receives freshwater flows from Gorst Creek, as well as several small independent drainages nearby. A small unnamed stream just east of Gorst enters Sinclair Inlet through a steep ravine, with a passage barrier at SR-16 (Kuttel 2003). This stream supports Coho and may be associated with a small pocket estuary (Map FP-1).

Gorst estuary is shallow, with fringing marshes and mud flats that provide excellent production of prey for salmonids (May and Peterson 2003). Estuarine area upstream of the highway has been virtually eliminated through fill and development in the estuary. Good estuarine conditions occur at the mouth, but to the north, the shoreline is heavily modified and armored (highway and railroad). To the east of the mouth, the estuary has been filled with commercial and industrial buildings.

Biological resources in the estuary include waterfowl concentrations at the mouth and along the north and south shorelines of Sinclair Inlet, and shorebird concentrations along the north shore. Bald eagle nests are associated with the estuary along the south shore of Sinclair Inlet with nest management and foraging areas within the entire estuary (Map WC-6). Continuous mixed marsh and patchy salt marsh occurs along the inner estuary and north and south shorelines of Sinclair Inlet (Map WC-8). Patchy eelgrass occurs between the edge of the marsh vegetation and adjacent mud and sand flats.

Shoreline armoring affects approximately 44% of shoreline length, road density is high (SR-3 lies adjacent to approximately 60% of shoreline length). No overwater structures exist within the study area with the exception of scattered timber piling (Map WC-9).

Although public access is limited, urban trails (part of the Mosquito Fleet trail) and a shellfish beach are located along the shores of the estuary (Map LU-4).

WATER QUALITY

The Kitsap County Health District (KCHD) currently monitors water quality in Gorst Creek from monitoring station GR01 located at the mouth of Gorst Creek. Current water quality is moderate, with some periods of elevated bacteria. However, cleanup work in the watershed has helped reduce pollution levels and statistical analysis for the creek shows an improving trend. In 2010, the City of Bremerton constructed a municipal sewer system in the Gorst area to connect 125 residences, many which had failing septic systems. Two pump stations, and 5 ½ miles of sewer main were installed (KCHD 2010; Map LU-5). KCHD is currently managing a follow-on project to connect commercial properties in the UGA to the new sanitary sewer. Approximately 20 properties have been connected to date.

Historically, Gorst Creek has not met fecal coliform standards and was placed in Water Quality Assessment Category 5 by the Environmental Protection Agency (EPA). Category 5 waterbodies are typically referred to as the 303(d) list, which require a Total Maximum Daily Load (TMDL) determination. Ecology reclassified Gorst Creek as Category 4b in 2004 due to Kitsap County's Pollution Surface and Stormwater Management Program, which is intended to address pollution sources (failed on-site sewage systems [OSS]) and bring Gorst Creek into compliance within a reasonable time frame (Ecology 2011). Category 4b is intended for waterbodies that have a pollution control program in place that is expected to solve the pollution problems. While pollution control programs are not TMDLs, they must have many of the same features and there must be some legal or financial guarantee that they will be implemented. Water quality impairment areas are shown on Map WC-11.

UGAS WITHIN THE WATERSHED

Gorst UGA

The Gorst UGA is located at the junction of State Route (SR) 16 with SR-3 (Map LU-1). The UGA, which includes approximately 330 acres, is a relatively small highway-oriented commercial and industrial center (Kitsap County 2006). As mentioned above, the UGA was sewered in 2010 to address ongoing water quality issues in Gorst Creek. Local real estate professionals indicate sewers will make large tracts of previously-developed land commercially viable for redevelopment. The UGA's location at the intersection of Highways 3 and 16 make it a natural to fill the current housing and commercial shortfall in Kitsap County. The UGA is currently associated with the City of Bremerton.

South Kitsap Industrial Area

The South Kitsap Industrial Area (SKIA), approximately 4,700 acres in area, is located along SR-3 southwest of the Gorst UGA. The majority of SKIA was annexed into the City of Bremerton in 2010. Portions of SKIA and

two unincorporated remnants of the SKIA UGA lie within or overlap the watershed boundary. SKIA is a major manufacturing center and is designated a "Regional Manufacturing/Industrial Center Suburban City" by the Puget Sound Regional Council (PSRC). The City of Bremerton is currently underway with efforts to promulgate a SKIA Sub Area plan, which will address capital needs through a Capital Facilities plan. (Kitsap County 2006).

ULID6

The ULID #6/McCormick UGA is located southwest of the City of Port Orchard, and totals approximately 2,400 acres. The UGA is characterized by relatively recent suburban type single-family residential development and a golf course. The ULID #6/McCormick UGA is currently unassociated with two abutting incorporated jurisdictions, the cities of Bremerton and Port Orchard. Sewer service is provided by City of Port Orchard and water by both Bremerton and Port Orchard (Kitsap County 2006).

EXISTING INFRASTRUCTURE

Sanitary Sewers

Sanitary sewers installed within the watershed by the City of Bremerton in 2010 are shown on Map LU-5. A total of 125 residences and commercial properties have connected to this system to date. Remaining sanitary facilities consist of OSSs; maps for these facilities are not available.

Water Supply

Public water-supply facilities are shown on Map LU-6. As shown, the City of Bremerton supplies drinking water to the Gorst UGA and portions of the SKIA UGAs. Water service to the ULID6 UGAs is also partially supplied by the City of Port Orchard. Wellhead Protection Areas are shown on Map LU-7.

Stormwater

Stormwater infrastructure is shown on Maps SW-1 and SW-2. These facilities consist primarily of roadside drainage ditches with culverts located at road crossings. As shown on Map FP-1, several of the culverts are fish passage barriers.

Transportation Systems

Transportation systems within the watershed are shown on Map LU-9. The systems consist primarily of local roads and collectors providing access to State Highways 3 and 16. In addition, an active rail line that connects the Puget Sound Naval Shipyard (PSNS) with the Bangor submarine facility and the Port of Shelton bisects the watershed from east to west.

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ATTACHMENTS

Map G-1: Regional Context
Map LU-1: Land Use Gorst Watershed Planning Area
Map LU-2: Land Use Gorst UGA Planning Area
Map LU-3: Landslides and Seismic Hazard Area
Map LU-4: Parks, Open Space and Public Land
Map LU-5: Sanitary Sewer Infrastructure Gorst UGA Planning Area
Map LU-6: Potable Water Infrastructure
Map LU-7: Well Head Protection Area
Map LU-8: FEMA Floodplain
Map LU-9: Transportation
Map FP-1: Existing Fish Passage Barriers
Map WC-1: Landcover
Map WC-2: Impervious Surfaces
Map WC-3: Waterbodies and Wetlands
Map WC-4: Soils
Map WC-5: Hydric Soils
Map WC-6: Wildlife, Bald Eagle, Osprey, Shorebird and Waterfowl
Map WC-7: PHS and Marine Fish
Map WC-8: Nearshore Marsh
Map WC-9: Shoreline Modifications Armoring
Map WC-10: Marine Sediment Processes Drift Cells
Map WC-11: Water Quality Impairment and Sediment Contamination
Map WC-12: Topography
Map SW-1: Existing Stormwater Infrastructure
Map SW-2: Existing Stormwater Infrastructure Gorst UGA Planning Area