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**To:** Stephanie Potts, Washington State Department of Ecology  
**From:** Bridget August, LG, LHG and John Monahan, FP-C  
**Date:** February 21, 2020  
**File:** 0504-161-00  
**Subject:** WRIA 9 Subbasin Delineations – Final Draft

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## INTRODUCTION

GeoEngineers, Inc. (GeoEngineers) is providing technical support to the Washington State Department of Ecology (Ecology) and the Watershed Restoration and Enhancement (WRE) Committees for Water Resource Inventory Areas (WRIAs) 7, 8 and 9. This memorandum provides a summary of the deliverable for Work Assignment GEO102, Task 2, WRIA 9 Subbasin Delineations.

## BACKGROUND AND CONTEXT

The Streamflow Restoration Act (SRA, Chapter 90.94 Revised Code of Washington [RCW]) specifies that by June 30, 2021, Ecology must establish a WRE Committee and adopt a WRE Plan in the Duwamish-Green Watershed (WRIA 9). The Duwamish-Green (WRIA 9) Watershed Restoration and Enhancement Plan (Plan) must address impacts on streamflows from consumptive use from new domestic permit-exempt wells (PE wells<sup>1</sup>) anticipated between January 19, 2018 and January 18, 2038. Dividing the Duwamish-Green WRIA into subbasins is an essential step in developing a plan that complies with the law. RCW 90.94.030(3)(b) states “The highest priority recommendations must include replacing the quantity of consumptive water use during the same time as the impact and in the same basin or tributary.” The *Final Guidance for Determining Net Ecological Benefit* (GUID-2094; Ecology 2019) states that, “Planning groups must divide the WRIA into suitably-sized subbasins to allow meaningful analysis of the relationship between new consumptive use and offsets. Subbasins will help the planning groups understand and describe location and timing of projected new consumptive water use, location and timing of impacts to instream resources, and the necessary scope, scale, and anticipated benefits of projects. Planning at the subbasin scale will also allow planning groups to consider specific reaches in terms of documented presence (e.g., spawning and rearing) of salmonid species listed under the federal Endangered Species Act.”

WRIA 9 includes the Duwamish River, Green River and associated tributaries. It also includes streams draining directly to Puget Sound between the City of Federal Way and the City of Seattle. The methods used to delineate subbasins in WRIA 9 are summarized below.

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<sup>1</sup> "PE wells" is used to refer to new homes associated with new permit-exempt wells and also new homes added to existing wells, including homes on group systems relying on permit-exempt wells.

## SUBBASIN DELINEATION METHODS

GeoEngineers worked with the WRIA 9 – Duwamish-Green WRE Committee to delineate subbasins for WRIA 9. The WRIA 9 WRE Committee considered existing subwatershed units to develop their subbasin delineations, including King County drainage basins. King County drainage basins are a boundary layer developed by King County using LIDAR technology to delineate drainage basins. There are 23 King County drainage basins in WRIA 9.

### Subbasin Selection Considerations

The WRIA 9 Committee used existing King County drainage basins and applied the following guiding principles to develop subbasin delineations:

- Use hydrologic boundaries.
- Combine King County drainage basins within the Urban Growth Area with lower expected growth of new homes using PE wells.
- Delineate subbasins at a finer scale in the area of the watershed expected to have the most homes using PE wells (the Middle Green River).

### WRIA 9 Subbasin Delineation

The WRIA 9 subbasin boundaries are based on King County drainage basin boundaries. GeoEngineers used existing drainage basin shapefiles from King County (King County 2018) to develop a map and GIS shapefile for the WRE Committee's subbasins. The WRIA 9 subbasin delineations are shown on Figure 1.

### WRIA 9 Subbasins

- **Central Puget Sound:** The Lower Puget Sound tributaries are combined. This includes the following King County drainage basins:
  - Lower Puget Sound (LPS) Seattle, Seola Creek, Salmon Creek, LPS Burien South, LPS Burien North, Miller Creek, LPS Normandy Park, Des Moines Creek and LPS Des Moines/Federal Way.
- **Duwamish River:** Longfellow Creek and Duwamish River drainage basins are combined into one subbasin.
- **Lower Green River:** Lower Green River West, Black River, Mill Creek, and Lower Green River East drainage basins are combined into one subbasin.
- **Soos Creek:** Soos Creek is one subbasin.
- **Jenkins Creek:** Jenkins Creek is one subbasin.
- **Covington Creek:** Covington Creek is one subbasin.
- **Lower Middle Green River:** The Middle Green River drainage basin below the confluence with Newaukum Creek.
- **Middle Middle Green River:** The Middle Green River drainage basin between the confluence with Newaukum Creek and the confluence with Franklin Creek.

- **Upper Middle Green River:** The Middle Green River drainage basin between the confluence with Franklin Creek and Howard Hansen Dam.
- **Newaukum Creek:** Newaukum Creek is one subbasin.
- **Coal/Deep Creek:** Coal Creek and Deep Creek are combined into one subbasin.
- **Upper Green River:** Upper Green River is one subbasin.

#### WRIA 9 Subbasins – Additional Considerations

There are some land areas included in the Ecology WRIA 9 boundary that are not included in the King County drainage basin boundaries. This discrepancy is because the King County drainage basin map used more accurate LIDAR technology to delineate drainage basins and watersheds. WRE Plans must address all of the land within the Ecology WRIA boundary. Therefore, the Committee decided to include the following hatched land areas on the map into WRIA 9 subbasins for WRE planning purposes (see Figure 2):

- Area A (hatched area north of Upper Middle Green River): Included in the Upper Middle Green River subbasin where PE well growth is likely to occur, rather than adding this area to the protected Upper Green River subbasin.
- Area B (hatched area south of Newaukum Creek): Included in the Newaukum Creek subbasin.
- Area C (hatched area north of Jenkins Creek): Included in the Jenkins Creek subbasin. GeoEngineers recommended including Area C into the Jenkins Creek subbasin based on how that area is addressed in salmon recovery planning.
- Area D (hatched areas north of Duwamish): Included in the Duwamish River subbasin.
- Several other minor adjustments were made by GeoEngineers along the fringes of WRIA 9 where the King County LIDAR based boundaries do not exactly match the Ecology WRIA boundary. Those areas were included in the adjacent subbasin. Those areas are hatched in blue on the map but were not uniquely identified due to their small size and location adjacent to or within one distinct subbasin.

#### NEXT STEPS

- The WRIA 9 WRE Committee agreed to use 12 subbasins to project PE well growth and consumptive use by subbasin. The Committee can revisit the subbasin delineations later in the planning process, if needed.

#### REFERENCES

Department of Ecology (Ecology), 2019. Final Guidance for Determining Net Ecological Benefit, GUID-2094 Water Resources Program Guidance. Washington State, Department of Ecology, Publication 19-11-079, p. 131.

King County, 2018. GIS Open Data, *Basin boundaries derived from terrain data, King County only / topo basin kc area*. <https://gis.kingcounty.opendata.arcgis.com/datasets/basin-boundaries-derived-from-terrain-data-king-county-only-topo-basin-kc-area>, December 3, 2018.

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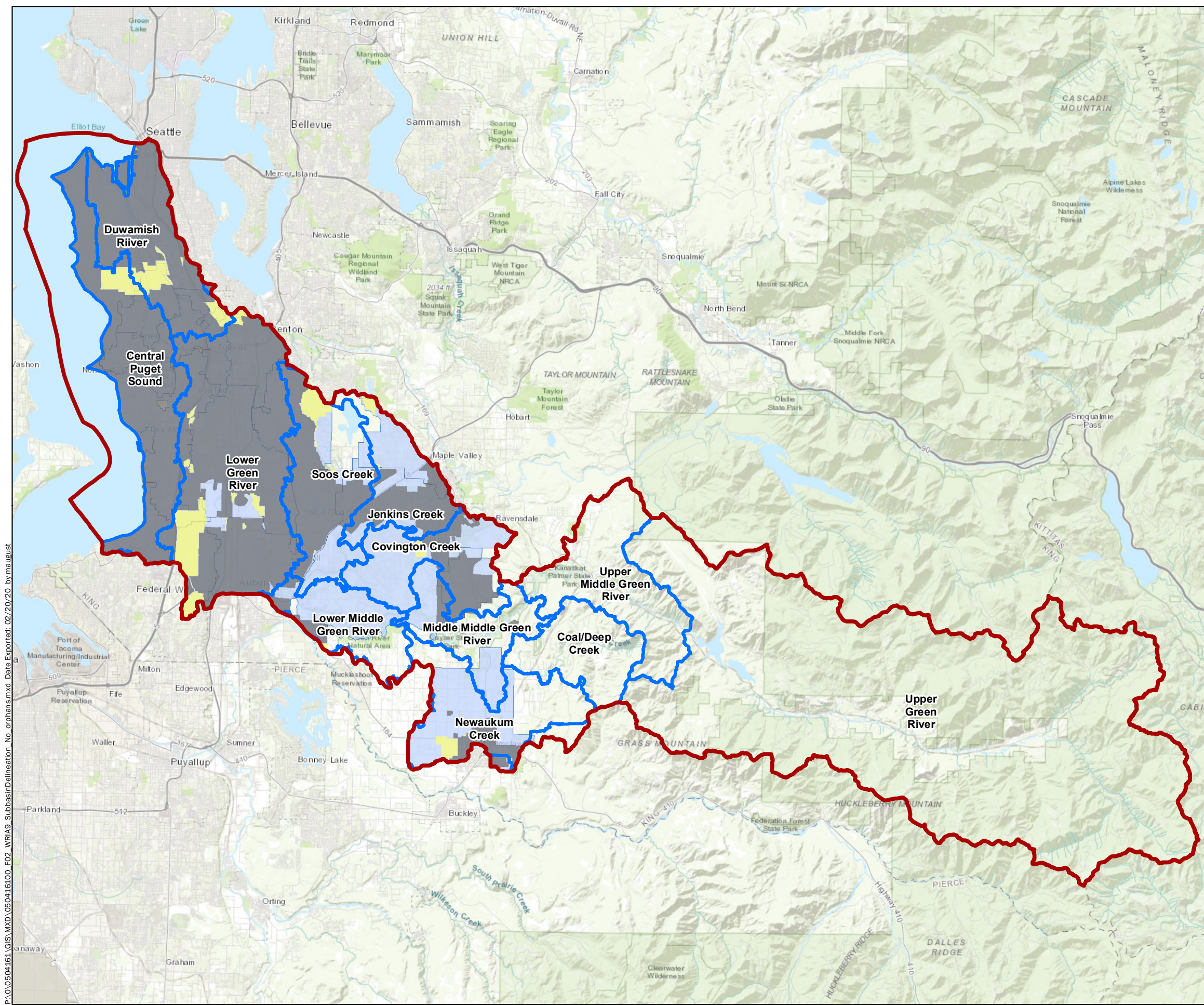
Attachments:

Figure 1. WRIA 9 Subbasin Delineations

Figure 2. WRIA 9 Subbasin Delineations with Discrepancy Areas

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**Legend**  

WRIA 9 Boundary

WRIA 9 Subbasins

WA DOH Group A Service Areas

**Washington State City Urban Growth Areas 2018**  

Unincorporated

Incorporated

**Notes:**  
1. The locations of all features shown are approximate.  
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.  
  
Data Source: ESRI Topographic Map Base  
  
Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet  

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WRIA 9 Subbasin Delineations

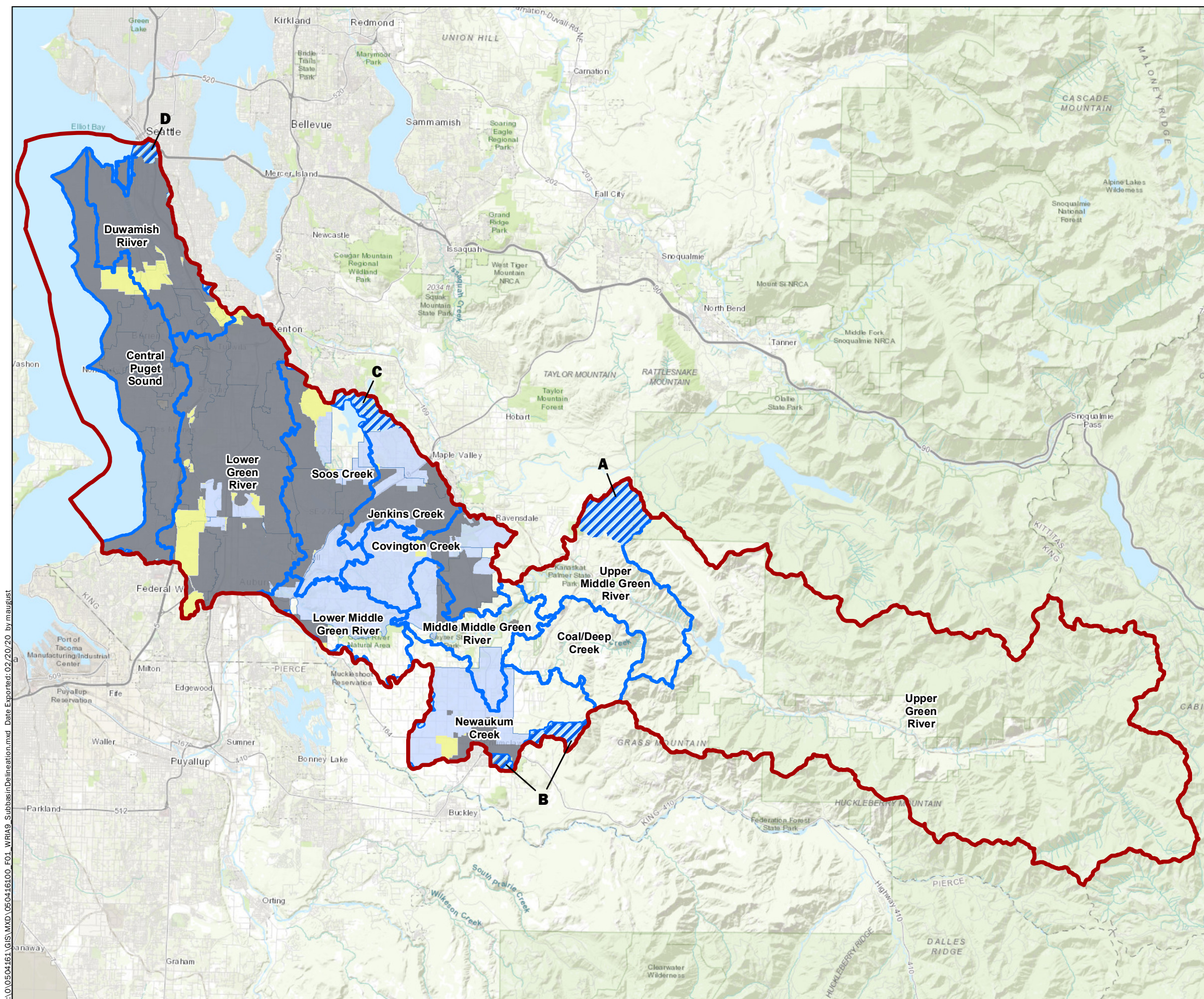
Watershed Restoration and Enhancement Plan  
King County, Washington

**GEOENGINEERS**

Figure 1

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**Legend**

- WRIA 9 Boundary
- WRIA 9 Subbasins
- Discrepancy Basin Areas
- WA DOH Group A Service Areas

**Washington State City Urban Growth Areas 2018**

- Unincorporated
- Incorporated

**Notes:**

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Data Source: ESRI Topographic Map Base

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

**WRIA 9 Subbasin Delineations with Discrepancy Areas**

Watershed Restoration and Enhancement Plan  
King County, Washington

Figure 2

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