Critical Aquifer Recharge Areas

Designation and Protection

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Critical Aquifer Recharge Areas

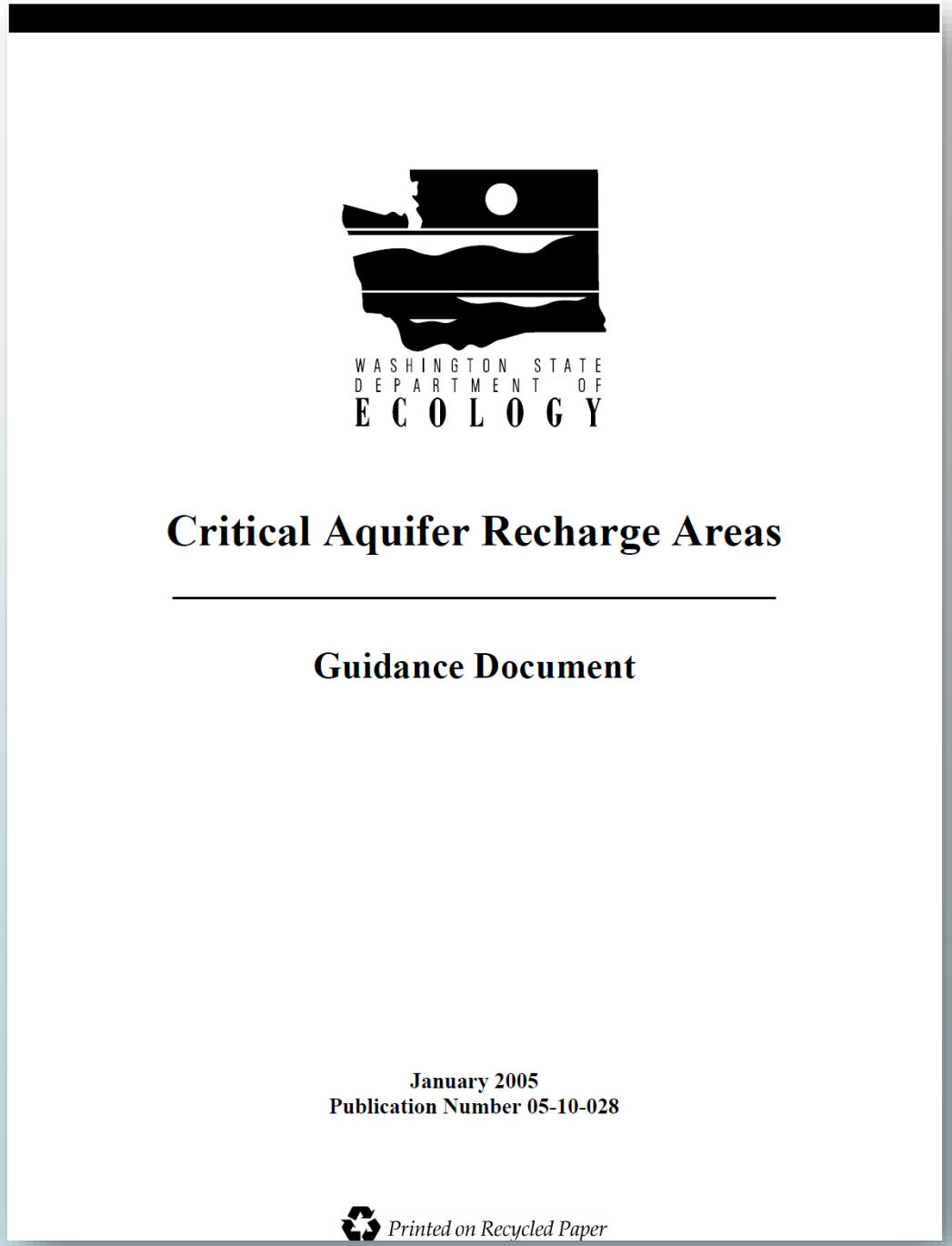
“Areas with a critical recharging effect on aquifers used for potable water.”

Growth Management Act (Chapter 36.70A Revised Code of Washington)

"Areas with a critical recharging effect on aquifers used for potable water are areas where an aquifer that is a source of drinking water is vulnerable to contamination that would affect the potability of the water."

Minimum Guidelines to Classify Agriculture, Forest, Mineral Lands and Critical Areas (Chapter 365-190 Washington Administrative Code)

Critical Aquifer Recharge Areas



WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

Critical Aquifer Recharge Areas

Guidance Document

January 2005
Publication Number 05-10-028

“The functions and values of Critical Aquifer Recharge Areas are to provide the public with ***clean, safe and available*** drinking water.”

Critical Aquifer Recharge Areas Guidance Document, Section 3, Page 9

Quality and Quantity

“In order to accomplish this goal, information is needed about the location and extent of aquifers that supply public drinking water, the susceptibility of these supplies to contamination, and potential contamination risks. In addition, planning, programs, and ordinances are needed to prevent contamination from occurring.”

Critical Aquifer Recharge Areas Guidance Document, Section 3, Page 9

Designate, then Protect!

Designation Step-by-Step

Identify where groundwater resources are located

Analyze the susceptibility of the natural setting where groundwater occurs

Inventory existing potential sources of groundwater contamination

Classify the relative vulnerability of groundwater to contamination events

Designate areas that are most at risk to contamination events.

Staff Work

Identify where groundwater resources are located

Mapped and considered:

- Aquifer extents, descriptions, and recharge areas
- Well Locations and Wellhead Protection Areas
- Surficial geology
- Topography
- Surface water bodies

BAS: *Conceptual Model and Numerical Simulation of the Groundwater-Flow System of Bainbridge Island, Washington* (USGS, 2011); *Task 1 - Hydrogeological Assessment of Groundwater Quantity, Quality, and Production* (Aspect, 2015); *Bainbridge Island Groundwater Model: Review Findings and Recommendations and Critical Aquifer Recharge Area Assessment* (Aspect, 2015); Well Information Database (KPUD, 2017)

Staff Work

Analyze the susceptibility of the natural setting where groundwater occurs

Susceptibility of the ground and aquifers considers:

- Depth to water
- Infiltration rate & recharge rate
- Permeability
- Presence or absence of an impermeable layer
- Hydraulic conductivity
- Vertical and horizontal gradients
- Groundwater flow direction and rate

Department of Health Source Water Protection Susceptibility Rating:
High – includes wells which draw water from an "unconfined aquifer (<150 feet deep)" (Perched, Semi-Perched and Sea Level)

BAS: *Conceptual Model and Numerical Simulation of the Groundwater-Flow System of Bainbridge Island, Washington* (USGS, 2011); *Washington's Source Water Protection Program (SWAP)* (DOH, 2005); *Hydrogeologic Framework, Groundwater Movement, and Water Budget of the Kitsap Peninsula, West-Central Washington* (USGS, 2014)

Staff Work

Inventory existing potential sources of groundwater contamination

Mapped and considered:

- Confirmed contaminated sites
- Land use and land use intensity (% impervious)
- Zoning

BAS: *Department of Ecology Toxics Cleanup Program's List of Confirmed and Suspected Contaminated Sites* (web-based data, 2017); *Critical Aquifer Recharge Areas Guidance Document – Appendix A: U.S. EPA Potential Sources of Drinking Water Contamination Index* (Ecology, 2005); *Ground Water Numerical Model Initial Scenario Selection Report* (COBI, 2009)

Staff Work

Classify the relative vulnerability of groundwater to contamination events

Methods of classification:

- Categories based on susceptibility
  - Water table sand and gravel aquifers
  - Deeper less susceptible aquifers
  - Confined aquifers

- Categories based on set priorities and risk
  - Large and medium public water supply systems one-year time of travel protection zone
  - Densely populated areas that rely on groundwater
  - Rural areas with a high dependence on groundwater
  - Discontinuous local drinking water aquifers of limited extent
  - Sole Source Aquifers

- Categories based on areas that have the same policies, plans, ordinances, and programs that will be applied

BAS: *Conceptual Model and Numerical Simulation of the Groundwater-Flow System of Bainbridge Island, Washington* (USGS, 2011); *Critical Aquifer Recharge Areas Guidance Document* (Ecology, 2005); *Support Document for Sole Source Aquifer Designation of the Bainbridge Island Aquifer System (Draft)* (EPA, 2012)

Staff Work

Designate areas that are most at risk to contamination events.

Staff Recommendation: Designate entire Island is a Critical Aquifer Recharge Area

Basis:

- Sole source aquifer system designation
- Nearly all of the Island identified as recharge area with significant recharge rates; remaining areas are discharge areas such as along shorelines or where groundwater sustains wetlands, lakes, and stream base flow
- Island-wide extent of shallow aquifers (Perched, Semi-Perched, and Sea Level) without a sufficiently-protective, overlying impermeable layer (DOH susceptibility rating = High)
- Potential for seawater intrusion

BAS: *Conceptual Model and Numerical Simulation of the Groundwater-Flow System of Bainbridge Island, Washington* (USGS, 2011); *Washington's Source Water Protection Program (SWAP)* (DOH, 2005); *Support Document for Sole Source Aquifer Designation of the Bainbridge Island Aquifer System (Draft)* (EPA, 2012); *Hydrogeologic Framework, Groundwater Movement, and Water Budget of the Kitsap Peninsula, West-Central Washington* (USGS, 2014); *Bainbridge Island Groundwater Model: Aquifer System Carrying Capacity Assessment (Task 3 Scenario)* (Aspect, 2016)

Discussion

Protection Step-by-Step

Protect by minimizing activities and conditions that pose contamination risks.

Ensure that contamination prevention plans and best management practices are followed.

Manage groundwater withdrawals and recharge impacts to:

- Maintain availability for drinking water sources.
- Maintain stream base flow.

Protect by minimizing activities and conditions that pose contamination risks.

Regulatory:

- Adopt State and Federal regulation
- Zoning
  - Overlay zoning
  - Large lot zoning
  - Cluster zoning
- Prohibition of High-Risk Activities
- Special Use Permits
  - Additional conditions/requirements
    - Hydrogeo assessment and site evaluation
    - Best Management Practices/Mitigation Plan
    - Pollution Prevent and Spill Response Plan
    - Low Impact Development
    - Monitoring
- Transfer of development rights

Protect by minimizing activities and conditions that pose contamination risks.

Non-regulatory:

- Land Acquisition
- Conservation Easements
- Water Conservation Planning
  - Aggressive rate structures
  - Incentives
- Household Hazardous Waste Collections
- Education and Outreach

Discussion