ISLAND COUNTY
CRITICAL AREAS ORDINANCE
PERIODIC REVIEW

DRAFT Recommended CAO Revisions – Report 1

Needs Assessment and Gap Analysis

March 2016

GMA No. 11853

DRAFT

Mutiny Bay, west side of Whidbey Island (Credit: WA Department of Ecology Coastal Atlas

Table of Contents

CHAPTER 1. INTRODUCTION 1-2
1.1 Purpose 1-2
1.2 Report Structure 1-2
1.3 Regulatory Requirements 1-3
CHAPTER 2. WETLAND RATING, REGULATIONS, AND MONITORING PROGRAM ... 2-1
2.1 Needs and Gaps 2-1
2.1.1 County's Wetland Identification and Rating System 2-1
2.1.2 Recommended Regulatory Revisions 2-2
2.1.3 Optional, Alternative Mitigation Strategies 2-2
2.1.4 County's Monitoring Program 2-3
2.2 Summary 2-4
CHAPTER 3. SURFACE WATER QUALITY IMPACTS AND MONITORING 3-1
3.1 Needs and Gaps 3-1
3.1.1 Background 3-1
3.1.2 Monitoring Program 3-2
3.2 Summary 3-3
CHAPTER 4. GROUNDWATER RESOURCES AND QUALITY PROTECTION 4-1
4.1 Needs and Gaps 4-1
4.1.1 Clarifications/Minor Corrections 4-1
4.1.2 Seawater Intrusion Analysis, Generally 4-1
4.1.3 Monitoring Program 4-3
4.2 Summary 4-5
CHAPTER 5. PUBLIC SAFETY AND PROPERTY RISKS FROM GEOLOGIC HAZARDS 5-1
5.1 Needs and Gaps 5-1
5.1.1 Overview 5-1
5.1.2 Mapping and Data Use 5-1
5.1.3 Regulations 5-2
5.2 Summary 5-2
CHAPTER 6. SUMMARY AND NEXT STEPS 6-1

Appendix A Tables 1-3 (Chart Summarizing Recommendations/Policy Options and Summaries of BAS and Existing Conditions Reports)

Appendix B References

DRAFT

CHAPTER 1. INTRODUCTION

1.1 Purpose

Island County is reviewing its Critical Areas Ordinance (CAO) in accordance with Growth Management Act (GMA) (RCW 36.70A) requirements. As an innovator of tailor-made approaches to protecting aquifers, wetlands, water quality and other resources, the County's approach to the current CAO Review process includes an ambitious and comprehensive review of its protection and management of critical areas.

Based upon best available science and changes in legal requirements, this report identifies recommended regulatory revisions. It also identifies optional actions to consider. However, due to the County's fast approaching June 30 deadline, the County may wish to focus its effort on the recommended revisions. On the issues the County wishes to further consider, additional detail will be provided in a subsequent report.

The CAO Review is being completed consistent with the County's 2014 grant agreement with Washington State Department of Ecology (Ecology) and the Washington State Department of Commerce (formerly Community Trade and Economic Development [CTED]). The agreement has been provided under the U.S. Environmental Protection Agency's National Estuary Program / Puget Sound Watershed Protection and Restoration Grant (#14-63401-002).

1.2 Report Structure

This report begins with an overview of GMA and its critical areas requirements (Chapter 1). The report focuses on the following key topics related to critical areas protection and management in Island County, which have been identified during meetings with County staff and members of the Technical Advisory Group (TAG) assembled for the project:

- Wetland Rating, Regulations, and Monitoring (Chapter 2);
- Surface Water Quality Impacts and Monitoring (Chapter 3);
- Groundwater Resources and Quality Protection (Chapter 4); and
- Public Safety and Property Risks from Geologic Hazards (Chapter 5).

Each key topic is addressed by describing relevant issues and then highlighting recommended revisions and optional considerations. In addition, the County's monitoring programs for wetlands, surface water, and groundwater are addressed.

Recommended revisions and optional considerations were identified by the consultant team during preparation of the *Best Available Science Report* (ESA et al., 2015b), analysis of County watershed data and monitoring programs as summarized in the *Existing Conditions Report* (ESA et al., 2015a), and

DRAFT

formal and informal discussions with County staff and the TAG. The needs and gaps are categorized into two groups: (1) recommended revisions; and (2) optional policy considerations.

1.3 Regulatory Requirements

In 1990, the Washington state legislature passed the GMA, which requires cities and counties to designate and protect critical areas. A mandatory periodic review is required at least once every eight years. The process includes a review of the jurisdiction's comprehensive plan and development regulations to ensure that they are up to date with any relevant GMA amendments and with changes in population growth. With respect to critical area code revisions, a 1995 amendment to the GMA, requires that best available science (BAS) be considered in designating and protecting critical areas. This is described and evaluated in the County's *Best Available Science Report* (ESA et al., 2015b). Critical areas issues are assessed and balanced along with other GMA requirements and its 13 goals.

DRAFT

CHAPTER 2. WETLAND RATING, REGULATIONS, AND MONITORING PROGRAM

GMA requires local municipalities to regulate and mitigate impacts to wetlands for the purpose of protecting wetland functions and values. Wetlands in Island County provide valuable storage for surface water and floodwater after storms, improve water quality, and provide habitat for valued fish and wildlife species. Island County has invested substantial resources to gain a thorough understanding of its wetlands and how they are affected by development and other activities. The County's rigorous and extensive review of wetlands (Adamus et al., 2006) combined with its comprehensive review of scientific information (Adamus et al., 2007) led to a customized set of wetland regulations locally adopted in 2008. Based on a review of current agency guidance and the available scientific literature, the majority of the regulations are still considered consistent with BAS as well as federal and state laws (*see* ESA et al., 2015b).

Even where GMA does not require revisions, there is room for improvement. County staff and permit applicants have noted issues with implementing the County's wetland regulations; in particular the Wetland Classification System and buffer determinations. Also, the County's voluntarily adopted monitoring program has faced several challenges. These issues are addressed below.

2.1 Needs and Gaps

The following sections highlight recommended revisions to the County's protections of wetlands.

2.1.1 County's Wetland Identification and Rating System

As part of the comprehensive 2008 update to its wetland regulations, the County crafted and implemented its own wetland rating system called the Wetland Classification System (ICC 17.02A.090E). In addition, the Wetland Identification Guide was developed to help landowners determine if a wetland or wetland buffer is located on their property. Island County differs from most jurisdictions in that the wetland classification system does not rely on Ecology's wetland rating system. Over the past several years, the majority of local governments in the Puget Sound area have adopted the Ecology wetland rating system in their CAOs and SMPs. This includes Jefferson, San Juan, Skagit, Whatcom, King, Pierce, Thurston, Kitsap, Mason, and Snohomish Counties. Adoption of the Ecology rating system does not necessarily mean these governments have also adopted Ecology's recommended buffer widths.

The BAS review of the County's regulations found that the Wetland Classification System was developed based on a consideration of best available science that met the criteria defined in WAC 365-195-905. Thus, there is no scientific reason to revise or update the Wetland Classification System or adopt the Ecology rating system at this time (ESA et al., 2015b).

In terms of administration, County staff report both positive and negative aspects of having a unique approach to wetland management. The rating system takes a logical and functional approach to categorizing wetlands in a manner that is understandable. However, like most rating systems, the

DRAFT

County's Wetland Classification System has a degree of subjectivity that can lead to time and resource consuming disputes between applicants and staff.

The approach requires that staff conduct an initial determination of wetlands for all permit applications that have a wetland-related issue. This requires the County to have a trained wetland professional on staff and that a wetland review will be triggered during the County's building permit process. County staff and TAG members agree that the identification of wetlands cannot be accomplished by a layperson even with the guidance materials produced by the County (CAO Update TAG, meeting notes, 2015). Rather, wetland identification and buffer determinations need to be conducted by qualified persons formally trained in ecology, biology, aquatic resources, and/or wetland science.

An informal poll of consultants who regularly assist applicants with wetland-related issues in Island County was conducted by County Planning staff in 2015. The poll results indicated that some see value in retaining the existing Wetland Classification System while others think it should be replaced with the Ecology state-recommended system.

2.1.2 Recommended Regulatory Revisions

The review of current state law and BAS guidance found three areas in the critical areas regulations for wetlands (ICC 17.02A) for which revisions are recommended (ESA et al., 2015b). First is the federal manual for wetland delineation, which is now required to be used under state law (WAC 173-22-035). While the County currently uses and requires use of the manual, this fact could be clarified. Second is the County's allowance of temporary impacts to wetland functions for two years without compensatory mitigation. A similar issue was addressed during the County's recent update of its FWHCA regulations, and the general mitigation section of the code (ICC 17.02B.080.E) was revised to require such mitigation. The County could address this issue with respect to wetlands. The third area relates to wetland buffer averaging.

The current wetland regulations allow for 50 percent reduction of a standard buffer width if a project meets specific criteria described in the code. This reduction is more than what Ecology considers BAS. Ecology's science-based guidance states that buffers should not be reduced by more than 25 percent of the standard buffer width. For example, a 100-foot buffer may be reduced to 75 feet wide, but a reduction to 50 feet would negatively impact the wetland functions. The County could revise the regulation to be consistent with BAS.

2.1.3 Optional, Alternative Mitigation Strategies

To implement compensatory wetland mitigation, mitigation ratios have historically been used by counties, Ecology, and the Corps. Mitigation ratios are still considered BAS and are used by local jurisdictions and accepted by resource agencies.

As an alternative to using mitigation ratios, Ecology developed *Calculating Credits and Debits for Compensatory Mitigation in Wetlands of Western Washington* (Hruby, 2012) for estimating whether a project's compensatory mitigation plan adequately replaces lost wetland functions and values. Termed the "Credit-Debit Method," this manual uses a "functions and values"-based approach to score functions

DRAFT

lost at the project site (i.e., "debits") compared to functions gained at a mitigation site (i.e., "credits"). A mitigation project is considered successful when the "credit" score for a compensatory mitigation project is higher than the "debit" score. The Corps and Ecology are increasingly relying on the Credit-Debit Method instead of mitigation ratios alone.

Also, the regulatory agencies are encouraging and sometimes requiring the use of alternative mitigation strategies instead of traditional on-site and in-kind compensatory wetland mitigation. As explained in detail in the *Best Available Science Report* (ESA et al., 2015b), the Corps and EPA have established a mitigation hierarchy. Also, to address known deficiencies with traditional on-site and in-kind compensatory wetland mitigation, the Corps and EPA released regulations governing compensatory mitigation for authorized impacts to waters of the U.S., including wetlands. The 2008 Federal Rule (Corps and EPA, 2008) emphasizes a watershed approach to mitigation as part of the planning, implementation, and management of mitigation projects.

The County's current regulations do not have specific provisions regarding Ecology's Credit-Debit Method or the Corps/EPA mitigation hierarchy, which would allow applicants and the staff to use these mitigation options. The County could expand its provisions for compensatory mitigation to include these alternative mitigation options should it wish to do so. However, its present approach to mitigation remains consistent with BAS.

2.1.4 County's Monitoring Program

The Island County Wetland Monitoring and Adaptive Management Program (WMP) was designed to monitor the health of wetlands countywide, use that information to evaluate the effectiveness of the CAO regulations, and adaptively manage wetlands. Modeled after the County's Surface Water Monitoring Program, the WMP includes three components: baseline monitoring, source identification, and adaptive management.

As part of the *Existing Conditions Report* (ESA et al., 2015a) analysis, ESA reviewed background documents and all of the summary monitoring reports and data completed to date and interviewed County staff regarding WMP implementation. In summary, the WMP has not been implemented as originally intended and therefore has not documented any changes in wetland health that can be attributed to the County's regulations. The evaluation found the WMP has room for improvement, including:

- The WMP, as designed, requires considerable County resources. (i.e., multiple facets requiring substantial County staff and resources).
- Issues with program design (e.g., better defining "wetland health," and sampling protocol for wetland water quality, nonrandom sample of wetlands, etc.).
- Challenges with gaining and retaining private property access over the course of the monitoring period, a challenge which was anticipated.
- Limitations of County permit tracking system.
- Lack of institutional knowledge due to high turnover among County staff conducting monitoring.

DRAFT

The County could consider ways to either revise the program structure and methods, devote additional resources, or reduce the scope of the program. Discussions among TAG members, County staff, and the consultant team note the following steps for the County, assuming the County wishes to maintain the program:

1. Emphasize source identification on a shorter timescale.
2. Clarify the definition of "wetland health." Consider alternative methods for evaluating wetland health, or valued components of wetland health (e.g., wildlife habitat), that leverage existing programs and processes that already collect information on wetlands (e.g., the Surface Water Monitoring Program, wetland rating forms).
3. Develop a sampling protocol for measuring water quality in wetlands.
4. The monitoring could be structured similarly to other wetland regulatory programs that focus on a site for a limited period after development has been completed.
5. Determine if resources could be targeted on specific watersheds of concern. Watersheds could be identified by the results of the watershed assessment or other information regarding wetland importance and condition.

Staff resources are limited and any future monitoring should consider those limits. A small task force could be convened to review and develop strategies to streamline the existing program, reduce complexity, and focus on key monitoring targets or criteria. Recommendations from County staff should be considered and the program reduced in scope and duration to meet the monitoring needs with allocated resources.

2.2 Summary

Revisions to the County's critical areas ordinance are recommended related to the federal wetlands manual, buffer averaging, and temporary impacts to include considerations of updates to BAS and state law. The County could also consider optional mitigation strategies and further refine its Wetland Monitoring Program, should it wish to increase its consistency with current federal and state guidance regarding to compensatory mitigation. BAS does not indicate further action within these latter areas. The summary table in Appendix B provides a list of these recommendations.

.

DRAFT

CHAPTER 3. SURFACE WATER QUALITY IMPACTS AND MONITORING

In 2006, the County developed and adopted a rigorous Surface Water Monitoring Program (SWMP) to "detect and respond to potential sources of contamination of surface water that are adversely affecting critical areas" (County Ordinance C-22-06). Under the SWMP, the County has conducted targeted water quality sampling over the last eight years.

An evaluation of the SWMP was conducted as part of the CAO review and is summarized in the *Existing Conditions Report* (ESA et al., 2015a). The SWMP is functioning as designed. The SWMP has resulted in documenting baseline conditions and identifying and comparing water quality implications of land use activities.

There are optional measures to improve the SWMP. Revisions could address water quantity monitoring, fine-tuning of monitoring locations, monitoring parameters, use of spatial analysis available to the County, and improved reporting. These options are discussed below.

3.1 Needs and Gaps

3.1.1 Background

The SWMP is codified in the County's critical areas regulations (ICC 17.02.040.L). The County's program is voluntary and not required by GMA, and thus does not need to be reviewed for BAS. Regulatory updates could incorporate incentives into the adaptive management framework of ICC 17.02.040.L.6. As noted within the *FWHCA Audit/Policy and Regulatory Framework* prepared in March 2014 for the FWHCA update, incentives can be an effective tool to achieve enhancement of critical areas, including conditions adjacent to surface waters (Berk, 2014). Within the five-step adaptive management approach outlined by existing regulations, using incentive approaches could be considered as a new approach between Step 2 (Education) and Step 3 (Enforcement). Incentives would need to be tailored to specific uses (e.g., incentives to encourage compliance for agricultural uses would need to be different than those for residential uses). Incentives could address specific issues such as riparian corridor management.

The current surface water management regulations do not emphasize low impact development (LID) and green stormwater infrastructure options. LID practices attempt to manage stormwater as close to its source as possible. Examples include bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. For green infrastructure, encouraging practices that use or mimic natural processes to infiltrate, evapotranspirate, or reuse stormwater or runoff on the site where it is generated should be included in the regulations. Despite having no regulatory requirements for using LID approaches, on site infiltration is the preferred approach to stormwater management for most development in the County.

DRAFT

3.1.2 Monitoring Program

Island County has been monitoring surface water sites since 2007 through its SWMP. Results indicate that water quality impairment is worse in watersheds dominated by development and agricultural use. The program has been less successful in identifying specific non-point sources of contamination since available resources have been used primarily for baseline and reconnaissance sampling.

The original design of the SWMP included consideration of watershed conditions to identify target watersheds, specifically each watershed's relative value (in terms of resources) and relative risk (in terms of human activity/natural phenomena with potential to degrade valued resources) (Adamus et al., 2006b). Watershed assessment results provided in the *Existing Conditions Report* (ESA et al., 2015a) provide additional information that could be considered in reprioritizing SWMP target watersheds, along with other new information that highlights the value of specific watershed areas.

The County could target specific areas to prioritize limited resources. The suggestions provided in this section are intended to focus resources on watersheds with greatest risk and highest resource value, and to provide improved tools and strategies for source identification and adaptive management within those watersheds. None of the options for updates to the SWMP provided in this section are required by Washington State law.

Discussions among TAG members, County staff, and the consultant team offered the following options to consider for updates to the SWMP.

- **Reprioritize Monitoring Efforts.** The existing SWMP emphasizes baseline monitoring. This was considered necessary at program initiation to understand water quality conditions and trends in representative natural, agricultural, and developed watersheds. This effort has been successful at establishing a baseline . Now that data have been collected for natural watersheds, there is a better understanding of baseline conditions in natural areas. Program resources could be refocused to provide source identification activities only in specific watersheds. The watersheds could be selected using the baseline information previously developed. Source identification monitoring will have the greatest likelihood of detecting and responding to potential sources of surface water contamination resulting from septic systems, agricultural activities, or other land use activities.

- **Adjust Monitoring Locations.** Sampling sites for ongoing monitoring should be selected based on risks to water quality and local resources of interest/value (e.g., estuaries, beaches, shellfish beds, salmonid habitat). The approach for prioritizing watersheds for ongoing monitoring could be built around the value/risk framework from Adamus et al. (2006). However it should include new inputs, including watershed assessment results from the *Existing Conditions Report* (as detailed below), baseline and reconnaissance results from past SWMP efforts, new information on stream juvenile salmon use, and other sources.

- **Use Spatial and Landscape Analysis for Prioritization.** At a coarse scale, watershed assessment results identify Island County watersheds where streams are at highest risk for changes in water flow, bed and bank stability, erosion, and water quality impairment. These

DRAFT

results, alongside additional analysis identifying where population growth and associated future land cover change are anticipated, could provide some guidance on future risks to watershed resources.

- **Improve Pollutant Source Identification through New Tools and Partnerships**. Previous SWMP efforts were inconclusive for most sites where source identification monitoring was instituted. This was because of a lack of funding/resources and because it was not always possible to conclusively determine the source of a pollutant. Program staff could seek additional technical tools to improve source identification. For septic system monitoring and investigation, this could include dye testing or use of a fluorimeter to detect subsurface inflows of septic seepage. For differentiating among human, canine, and agricultural (livestock and manure) sources of septic contamination, microbial source tracking (MST), wildlife segment sampling, constituents of emerging concern (CEC) sampling, and other methods could be considered.

  County staff implementing the SWMP could continue to partner with the Whidbey Island Conservation District and the Snohomish Conservation District (for agricultural activities), Island County Sound Water Stewards, and other local groups to assist in identifying and responding to water quality concerns through source identification efforts. Support provided through partnerships could include initial identification of potential water quality concerns and efforts to respond once a likely source of contaminants has been identified.

- **Employ New Water Quantity and Habitat Monitoring Protocols.** The County could establish permanent stream gages on Maxwelton, Glendale, and Kristoferson Creeks (streams supporting salmonid populations). The information could improve understanding of aquatic habitat conditions, and provide information useful to understanding the impacts of existing and new land use activities within these watersheds. If possible, this component should be integrated with the County's existing groundwater monitoring protection program (addressed in Section 4.1.3). In addition to permanent stream gages, a method for SWMP flow measurements at monitoring sites could be formally defined to improve the consistency and accuracy of measurements moving forward.

- **Improve Public Outreach and Information about Program.** In order to help the community better understand ongoing water quality issues, summary information from annual monitoring activities could be provided on the County website. These materials could be paired with informational materials for members of the community to learn more about what they can do to protect water resources, including actions on their property and volunteer opportunities.

3.2 Summary

The County's regulations for surface water resources as they relate to wetlands and groundwater resources are consistent with BAS and state legal requirements. Options for improvement are identified above and in the summary table in Appendix B.

DRAFT

CHAPTER 4. GROUNDWATER RESOURCES AND QUALITY PROTECTION

Groundwater resource protections can be broadly divided into three areas: (1) maintaining adequacy of groundwater resources (groundwater quantity), (2) preventing seawater intrusion impacts (groundwater quantity and quality), and (3) preventing anthropogenic groundwater contamination (groundwater quality). Current regulations pertaining to groundwater resource and groundwater quality protection are predominantly found in ICC 8.09.097 - Critical Aquifer Recharge Area Protection and ICC 8.09.099 - Seawater Intrusion Protection, but some additional provisions are also found in ICC 11.03 - Stormwater and Surface Water and ICC 8.07D - Onsite Sewage Systems. The County also manages a robust Groundwater Monitoring Program as described in the *Existing Conditions Report* (ESA et al., 2015a).

As noted in that report, the monitoring activities and results are largely meeting program objectives, which include; documenting the occurrence of wells; documenting subsurface hydrogeologic conditions; and protecting groundwater resources from anthropogenic contamination, non-sustainable pumping, and seawater intrusion. County groundwater protections are consistent with BAS and revision is not required. Options for improving or providing clarification are identified below.

4.1 Needs and Gaps

4.1.1 Clarifications/Minor Corrections

The County has a few Comprehensive Plan provisions which it may wish to clarify or correct.

- Chapter 2 of the Comprehensive Plan discusses the 1989 joint seawater intrusion policy crafted by Island County and Washington Department of Health. *See* ICC 8.09.099. This joint policy has since been amended. The County may wish to note the revisions.

- Chapter 2 mentions construction of groundwater flow and seawater intrusion models in multiple places (page 2-4, line 3; page 2-10, lines 12-17) as the best means of managing groundwater resources (including seawater intrusion protection). Rather than a model, the County's approach to seawater intrusion prediction relies on a combination of monitoring data to identify trends and requiring proponents of new developments to perform hydrogeologic evaluations in areas of elevated seawater intrusion risk (Kelly pers. comm., 2015). Hydrogeologic evaluations *may* include seawater intrusion modeling analyses. The County may wish to consider adding clarifying language.

4.1.2 Seawater Intrusion Analysis, Generally

Current predictive analysis of seawater intrusion is unavoidably imperfect. In addition, it can be challenging to balance the level of effort associated with predicting seawater intrusion against the uncertainties associated with predictive methods. The following points expand on these challenges:

DRAFT

- Where groundwater flow modeling is required to assess seawater intrusion risk as part of hydrogeologic assessments, modeling a single proposed development may not capture the future outcome of multiple developments occurring within a given area.
- The expected future location of the saltwater wedge and the associated timing of wedge movement are typically not evaluated for areas that do not currently exhibit elevated seawater intrusion risk through the County's monitoring program. New groundwater withdrawals can potentially create intrusion impacts that are not readily observable and may only be detectable decades (or longer) after pumping begins. Monitoring seawater intrusion indicators (chloride, electrical conductance, groundwater elevation) over time is a key component of Island County's seawater intrusion management program. However, this approach assumes that the monitoring results will be indicative of the expected intrusion outcome early enough to take action, and that new groundwater withdrawals capable of causing intrusion are not approved prior to the ability of monitoring to detect problems and thus trigger requirement for a hydrogeologic evaluation. While it may be practical to make such an assumption, it cannot be rigorously verified without predictive analysis.
- Even where elevated seawater intrusion risk is noted in coastal areas and thereby requires hydrogeologic evaluation for new development proposals, proposals farther inland will not require hydrogeologic evaluations because monitoring will not show elevated risk. However, inland withdrawals can affect the overall groundwater budget and groundwater availability in (downgradient) coastal areas. Inland pumping can exacerbate intrusion issues in nearby coastal areas that already show evidence of seawater intrusion.
- The potential for seawater intrusion is expected to be sensitive to climate change. Where warming temperatures increase plant evapotranspiration, groundwater recharge is likely to decline. Reduced recharge will cause reduced groundwater elevations, and thereby less hydraulic head to counteract seawater "pushing in" on coastal aquifers. Sea level rise also has the potential to affect the position of the saltwater wedge in (limited) areas where streams intersect a sea-level aquifer and maintain nearby groundwater elevations.
- While island-wide the density of impervious area is relatively low, areas with concentrated impervious surfaces can cause localized reductions in recharge. It may be prudent to consider such recharge reductions in areas where the risk of seawater intrusion is elevated or anticipated to be elevated.

The County Hydrogeologist is aware of the issues discussed above. Predictive analysis using groundwater models is expensive and may not be warranted in all areas. One option for addressing these issues is to perform predictive modeling in selected areas based on consideration of hydrogeologic conditions, cumulative rates of new groundwater development, and existing indications of seawater intrusion risk (e.g., elevated risk down-gradient of areas with new groundwater development). Such targeted modeling analyses could help quantify risk in areas of greatest concern, and guide requirements in areas of perceived lesser concern.

Other suggestions include adding a policy stating that seawater intrusion monitoring performed by the County, and/or required of groundwater users, will be designed to gain basic data in all areas and enhance

data collection in identified vulnerable areas. This would support future modification of Island County Code to require increased data collection if desired. Similarly, the seawater intrusion policy could state that hydrogeologic analyses required for new development in seawater intrusion vulnerable areas will be commensurate with identified vulnerability and the magnitude of proposed groundwater withdrawals.

4.1.3 Monitoring Program

Monitoring activities are designed to address groundwater quality (nitrate, arsenic), groundwater availability (groundwater levels), and seawater intrusion (groundwater levels, chloride and conductivity).

Water Quality – Nitrate. The spatial and temporal coverage of nitrate monitoring is relatively good. The County samples 50 wells twice yearly. Group A public water systems are sampled at least yearly, and Group B public water systems are sampled every three years.

Nitrate concentrations greater than the Washington State drinking water standard of 10 mg/L NO3-N are uncommon and typically limited to relatively small areas. Many wells with high nitrate concentrations are located immediately adjacent to wells with low concentrations. Areas with a high percentage of wells with elevated nitrate concentrations (2 mg/L NO3-N or above) include the Greenbank area, the Freeland area, the northwest tip of Camano Island, the southern peninsula of Camano Island, and the area west and southwest of Oak Harbor. Numerous small clusters of wells with elevated concentrations can be observed in other rural regions of the County. Upward concentration trends were noted in 46 wells, whereas numerous (260) wells with multiple data points exhibited neither upward nor downward trends.

The County should continue its process of reviewing nitrate data for simultaneous occurrence of upward trends in concentrated areas of elevated nitrate, and ensure that sufficient monitoring densities are maintained in these areas. The County is also embarking on a program to inventory septic systems and compile associated information into a database. Future nitrate analysis could include consideration of the distribution and condition (e.g., age) of septic systems.

Water Availability – Groundwater Level Trends. Monitoring trends in groundwater levels helps to identify when groundwater withdrawals are causing a significant decline and potentially reaching elevations typically associated with seawater intrusion. Under the County's current monitoring program, most wells with sufficient data for time-series water-level analysis are based on measurements that are over 10 years old and are thus not necessarily indicative of recent trends. This is true for 8 of the 9 wells showing declining trends. Some of the wells with declining trends do not have neighboring wells that suggest non-declining trends, and even where such wells are nearby, the analysis performed for this project did not assess whether they represent the same aquifers.

The County routinely monitors water-level elevation in 50 wells included in its dedicated monitoring network, and monitored wells neighbor about half of the wells with past observed declines. For all wells with noted declines, it may be worthwhile to assess whether neighboring (previously or currently) monitored wells are completed in the same aquifer. Where no nearby wells in the same aquifer are available, it may also be worthwhile to seek cooperation of the owner of the well where declines were noted, or from nearby well owners whose wells are screened in the same aquifer, to join the County's monitoring network. The County might also consider adding water-level monitoring points to areas with higher estimates of consumptive use relative to recharge and areas of higher development density.

Seawater Intrusion. Island County has been proactive in identifying areas with seawater intrusion risk and successfully working with residents on ways to minimize seawater intrusion. The requirement for public water systems in areas of medium or higher seawater intrusion risk to sample chloride twice annually allows the County to have a broad-scale chloride monitoring network (assuming that most public water systems comply with the ordinance). Additionally, most of the wells in the County's monitoring network (27 out of 50) are located in areas of medium or higher seawater intrusion risk. Ways that the existing monitoring network could be further improved include the following:

- Public outreach efforts should be continued to increase sampling compliance of public water systems with sources located in areas of medium-or-higher seawater intrusion risk.
- Groundwater level elevations are used to identify areas of medium-or-higher seawater intrusion risk. Once identified, risk is further evaluated using ongoing chloride monitoring. Coastal areas exist where static groundwater level measurements showed (low-risk) elevations above the cutoff value of 8.4 feet NAVD88. In these areas, semi-annual chloride monitoring is not required. It may be worthwhile to:
  - Compare the well completions associated with measured surveyed static water levels with the remaining well completions in these areas to assess whether the water-level data are associated with above-sea-level perched aquifers and pumping is concurrently occurring in sea-level (or deeper) aquifers that are susceptible to intrusion. If this is the case, additional water-level monitoring may be indicated.
  - Review the data from the aforementioned areas to assess whether the water-level data represent recent conditions. Where data are greater than 10 years old, and wells are completed in intrusion-susceptible aquifers, additional measurement of surveyed static water levels may be useful to confirm whether these areas remain low risk. Review of chloride data from these areas may also be helpful.
  - Additionally, a few remaining areas exist along the coast with no surveyed static water-level data. These areas could be reviewed relative to historic and current development and available chloride data to ascertain whether supplemental water-level measurements are indicated.
- Once areas are identified as medium-or-higher risk, ongoing seawater intrusion monitoring in public water system wells is typically limited to water quality parameters. Water-level monitoring in these areas is largely limited to wells in the County's monitoring network. The County may want to consider expanding its monitoring network into medium-or-higher risk areas that exhibit increasing chloride trends and do not include current ongoing water-level monitoring. Water-level monitoring can be useful for additional analyses such as calibrated groundwater models. The south peninsula of Camano Island is an example of such an area.

DRAFT

Groundwater Use. Estimation of groundwater withdrawals does not require actual water-use data from all wells, but benefits from direct data from the larger public water system and enough actual data from smaller systems and domestic wells to make reasonable assumptions about typical water use. To that end, the County might consider encouraging reporting from Group B and domestic well source meters to improve estimates of water use per residential hookup or per domestic well.

Using generic assumptions to estimate groundwater pumping withdrawals, the *Existing Conditions Report* (ESA et al., 2015a) noted agricultural water use may constitute a significant portion of total groundwater pumping, but that existing data could not support accurate estimates of agricultural water use. The County could consider improving estimates of agricultural water use based on either metering or calculations using acreage, crops, and irrigation methods.

Estimating groundwater use on a year-to-year basis is neither necessary nor recommended. However, periodic assessment of groundwater use in comparison to groundwater recharge (which may change due to rising global temperatures) may be useful for assessing pumping stresses on the groundwater flow system. Data gathering sufficient to estimate changes in groundwater use during drought may also be useful.

A review of the County's Groundwater Monitoring Program found a number of improvements that could be considered, including the following:

- Available groundwater level trend data are often over 10 years old and are thus not necessarily indicative of recent trends. Areas should be identified where enhanced time-series groundwater level data could be useful.
- Seawater intrusion monitoring is comprehensive, but could be improved by increasing the compliance of data submittal by public water systems and expanding measurement of groundwater elevations (or clarifying the significance of existing measurements) in selected areas.
- Metering pumping from water-supply wells provides data from the larger water systems, but data are not reported from the smaller systems or domestic wells. Agricultural groundwater use estimates are relatively inaccurate. Improvements to the accuracy of this data could be explored.

4.2 Summary

The County's policies and regulations for groundwater resources and quality protection are consistent with state law and BAS. But, there are options for improvement, as identified above and in the summary table in Appendix B.

DRAFT

CHAPTER 5. PUBLIC SAFETY AND PROPERTY RISKS FROM GEOLOGIC HAZARDS

The purpose of geologic hazard policies and regulations is to reduce risks to human life and safety, and minimize damage to structures and property. Eliminating all risks from geologic hazards is not practical, but regulations can be used to reduce risk to acceptable levels. Determining an acceptable level of risk for each type of hazard will require consideration of other policy and community values.

The following addresses recommendations for regulatory revisions of to protect public safety and property risks from geologic hazards. Needs and gaps were identified during the best available science review for geologically hazardous areas (ESA et al., 2015b) and conversations with County staff.

5.1 Needs and Gaps

5.1.1 Overview

Island County is located in area of relatively high seismic risk and several fault zones have been identified (see ESA et al., 2015b). For most building development situations, seismic hazards are covered via the International Building Code. Some locations are more susceptible to seismic events due to the potential for soils to deform or liquefy during prolonged shaking. The Washington State Department of Natural Resources (DNR) Geology Division has developed maps designating areas with high susceptibility that are used to inform the County. The mapping also identifies peat areas as susceptible to deformation during earthquakes.

Erosion associated with bluff retreat is a geologic hazard in Island County. Setbacks from steep slopes are required through the County's recently updated SMP, which governs critical areas located within the County's shorelines. However, development proximate to such slopes, and also at the toe, remains an ongoing concern. Given recent slide events, the County may wish to consider prohibiting development at the toe of vulnerable slopes and/or expanding setback requirements from vulnerable slopes.

Low areas along the shoreline of Island County may be subject to tsunamis either from earthquakes or localized landslides (see *Best Available Science Report* [ESA et al., 2015b] for references). Localized tsunamis generated by more localized seismic events, underwater landslides, and landslides into water are all possible along the shores of Island County although limited data is available regarding vulnerable areas. Low-lying properties are already subject to flooding from tidal surge. The County's SMP addresses development intensities within these areas. However, methods of notification could be developed to address this type of geologic hazard to provide support for management and protection of public safety and property where data is available.

5.1.2 Mapping and Data Use

Currently the County is using steep slopes maps and the Washington State Coastal Atlas as a screening tool for steep/unstable slopes. While this is a reasonable screening tool, other maps produced by the U.S.

DRAFT

Geologic Survey (USGS) and the DNR Geology Division delineate landslides that are not included in the Coastal Zone Atlas. LiDAR imagery can be used not only to identify steep slopes, but to readily identify large-scale landslides. The *Best Available Science Report* (ESA et al., 2015b) describes these sources in detail. Due to recent interest in landslide hazards at the state level, additional landslide susceptibility mapping may be conducted by Washington State in the future. The County could develop potential landslide hazard maps as screening tools for use in determining the need for geologic hazard reports and the level of detail that should be presented.

Maps of erosion and bluff retreat rates developed by the USGS cover most of Island County. The DNR has produced maps of soil liquefaction potential that cover Island County, as well as a tsunami hazard inundation map that covers portions of Island County for a large Cascadia subduction earthquake. Tsunami inundation maps are likely to be developed for seismic events along faults in Puget Sound and in some cases have been completed at a localized level, such as Seattle and Tacoma.

Comment [A1]: Source?

Comment [A2]: USGS 1:24,000 quadrangle geologic maps

5.1.3 Regulations

Geologically hazard areas are designated as critical areas in ICC 17.02A.020.The County regulates landslide and steep slope hazard areas within ICC 11.02 - Clearing and Grading Requirements. Erosion is addressed in the clearing and grading requirements and in ICC 11.03 - Stormwater and Surface Water. The erosion hazard associated with shoreline erosion and bluff retreat or shoreline retreat as addressed in the SMP could be expanded upon. Seismic hazards are currently addressed through the International Building Code as adopted by Island County. However, areas that are particularly vulnerable to seismic events such as liquefiable soils do not have specific standards. Flooding regulations in ICC 14.02 address the tsunami risk through its requirements for coastal high flood hazard areas. This is coupled with updated FEMA mapping and the SMP, which restrict development in certain shoreline areas.

GeoEngineers (2015) provided a review of the existing geologic hazards and potential changes to the Island County Code. In the report, GeoEngineers stated that "it is our opinion and experience that the Island County geologically hazardous area code is administered in a reasonable manner." The report suggested changes to the regulations to clarify the intent and purpose of geotechnical reports for steep/unstable slopes and factors that should be considered in assessing slope stability and mitigation measures for building on steep/unstable slopes.

5.2 Summary

Although generally consistent with BAS, the County could improve its regulation of geologically hazardous areas, particularly with respect to setbacks/development prohibitions proximate to erosion prone slopes. The summary table in Appendix B provides a list of these recommendations.

DRAFT

CHAPTER 6. SUMMARY AND NEXT STEPS

The purpose of the Needs Assessment and Gap Analysis process and report is to identify recommended revisions to the County's critical areas ordinance based on a review of existing conditions and best available science (see Appendix A). This assessment indicates there are only a few issues for which revisions are recommended. Recommendations are primarily for wetlands and geologically hazardous areas. No recommended revisions are identified for surface water quality or groundwater resources. However, policy options for each critical area topic (wetlands, surface water quality, groundwater resources, and geological hazards) are identified, with further detail to be provided in the next phase, with emphasis on the areas of the County is most interested in further considering.

DRAFT

Appendix A - Summary Tables

Table 1. Summary of Recommended and Optional Revisions

Recommended Revisions	✓
Optional Policy Considerations	★

Wetland Rating, Regulations, and Monitoring	
✓	Consider specifically requiring the use of the federal manual for wetland delineation.
✓	Consider requiring compensatory mitigation for temporary impacts to wetland functions that will last two or more years.
✓	Consider prohibiting reduction of wetland buffers below 75 percent of the standard buffer width.
★	Consider alternative mitigation strategies with a focus on watershed scale planning and management.
★	Refine wetland monitoring program; appoint task force to address.
Surface Water Quality Impacts and Monitoring	
★	Consider public education strategies that emphasize the importance of water quality and effective surface water management.
★	Although on-site infiltration is often the preferred approach for development, where warranted, further consider use of LID and green stormwater infrastructure approaches in specific watersheds.
★	Incorporate incentives into the adaptive management framework (ICC 17.02.040.L.6).
Groundwater Resources and Quality Protection	
★	Available groundwater level trend data are often over 10 years old and are thus not necessarily indicative of recent trends. Areas could be identified where enhanced time-series groundwater level data could be useful.
★	Seawater intrusion monitoring is comprehensive, but could be improved by increasing the compliance of data submittal by public water systems and expanding measurement of groundwater elevations (or clarifying the significance of existing measurements) in selected areas.
★	Metering pumping from water-supply wells provides data from the larger water systems, but data are not reported from the smaller systems or domestic wells. Agricultural groundwater

DRAFT

	use estimates are relatively inaccurate. Improvements to the accuracy of this data could be explored.
☆	Review all forms of proposed development for effects on water availability.
Public Safety and Property Risks from Geologic Hazards	
✓	In next SMP amendment or update, consider increasing setbacks and/or prohibit development in areas vulnerable to bluff retreat or shoreline retreat and landslides.
✓	In next SMP amendment or update, consider expanding tsunami hazard protections.
✓	Provide specific development standards for areas vulnerable to seismic events.
☆	Provide clarity on the variable risk posed to areas above, below, and on unstable or potentially unstable slopes.
☆	Use and/or adopt multiple sources of available maps and information regarding for landslides, soil liquefaction potential, and tsunami hazards as screening tools during permit review.
☆	Use County's 2007 and 2014 LiDAR in refining hazard identification.
☆	Consider notification requirements for geologically hazardous areas (i.e., property sales and/or title)
☆	Clarify intent and purpose of geotechnical reports for steep/unstable slopes.

DRAFT

Tables 2 and 3

The two tables below summarize the findings from the *Existing Conditions Report* (ESA et al., 2015a) and the *Best Available Science Report* (ESA et al., 2015b). Table 2 highlights updates to scientific literature and an assessment of the current regulatory provisions for each type of critical area. Table 3 summarizes the review of watershed conditions and evaluation of the County's monitoring programs for wetlands, surface water, and groundwater.

Table 2

Summary of Findings of Best Available Science Review (ESA et al., 2015b)

Critical Area	Updates to Scientific Literature	Assessment of Current Provisions
Wetlands	The U.S. Army Corps of Engineers (Corps) released an update to federal wetland delineation manual with a regional supplement released in 2012.	Wetland delineations performed by Island County staff do require use of the updated 2012 Corps' federal manual and regional supplement. However, the wetland delineation worksheet used by County residents and provided by the County does not require use of the Corps documents. The County uses a wetland rating system separate from Ecology's updated 2014 wetland rating system. The County's system is consistent with BAS. Island County allows for greater buffer reduction than Ecology's published information and guidance suggest. Although not required, the general mitigation section of the critical areas code could be expanded to include provisions regarding consolidated offsite mitigation and advance mitigation. .
	The Washington State Department of Ecology (Ecology) released a revised wetland rating system with new scoring methods in 2014, effective January 1, 2015.	
	Ecology published updated wetland buffer information confirming important water quality functions of buffers in 2013.	
	Ecology, in coordination with the Corps and EPA, released a two-part guidance document on compensatory mitigation in 2006.	
	Use of mitigation alternatives and strategies such as in-lieu fee programs and mitigation banking is increasing.	
Critical Aquifer Recharge Areas	Ecology released a guidance document in 2005 for CARAs discussing the importance of groundwater quantity and recharge preservation.	The County's CARA ordinance protects groundwater quality. The County protects groundwater quantity through monitoring and confirms water supply availability during permitting. Island County incorporates the County seawater topic paper into provisions for seawater intrusion and management. The County has the most sophisticated and data-intensive program for managing seawater intrusion among all coastal counties in the state.
	Ecology's 2005 CARA guidance document lists all activities that should be subject to County review for potential contamination of groundwater.	
	Ecology's 2005 CARA guidance document provides recommendations for protecting recharge areas by limiting total impervious areas.	
	The 2005 CARA guidance document includes a list of all investigation elements required for hydrogeologic site evaluations.	

DRAFT

Critical Area	Updates to Scientific Literature	Assessment of Current Provisions
	Island County published the Seawater Intrusion Topic Paper in 2005; it is recognized statewide as BAS for seawater intrusion issues.	
Frequently Flooded Areas	The National Marine Fisheries Service (NMFS) issued a Biological Opinion in 2009 regarding the protection of Endangered Species Act-listed salmonid species from the effects of floodplain development activities.	The County recently completed its Shoreline Master Program update, which protects frequently flooded areas located within the County's shorelines. The County's Flood Damage Prevention Ordinance protects human health and public safety. The updated FEMA mapping further limits development in those areas.
	The Watershed Company and Parametrix authored a BAS report for Fish and Wildlife Habitat Conservation Areas (FWHCAs) in 2014 confirming the ecological functions of floodplains and their connection to other critical areas.	
	Federal Emergency Management Agency (FEMA) issued a preliminary revised Flood Insurance Rate Map (FIRM) for the County in March 2015, effective July 2016.	
	Island County's Shoreline Master Program (SMP) also regulates some frequently flooded areas in the County.	
	In 2013, FEMA released a revised Community Rating System Coordinator's Manual, and in 2015 Ecology released new guidance materials for frequently flooded areas. Both documents discuss the importance of increasing protection of both development and ecosystem functions in the floodplain.	
Geologically Hazardous Areas and Steep Slopes	LiDAR imagery for the entire County was collected in 2007 and 2014 to help identify geological hazards such as potential landslide areas. Recent slide events have emphasized the significance of the issues.	Use of the County's LiDAR imagery data could be considered in refining hazard identification. The County's SMP addresses steep slopes located within shoreline areas. The County may wish to consider expansion of setback requirements and/or prohibiting development at the toe of problematic slopes in its next SMP update or revision. Areas subject to localized tsunamis are protected through the County's recently updated Shoreline Master Program.
	Recent peer-review literature (2002, 2008, and 2010) indicates localized tsunamis could potentially occur along the shores of Island County.	

DRAFT

Table 3

Summary of Findings of Existing Conditions Report (ESA et al., 2015a)

Critical Area	Watershed Conditions and Recommendations	Assessment of Monitoring Program
Wetlands	Low-gradient floodplains and depressional wetlands are important areas for surface water storage; depressional wetlands are more commonly found across Whidbey and Camano Islands.	Wetland Monitoring Program challenges include turnover of County staff, the considerable scope of program, private property access challenges, water quality sampling protocol difficulties, and lack of reporting Wetland vegetation data collected more consistently than wetland water quality data. No trend analysis of collected wetland data has occurred.
	Depressional wetlands could be targeted as highest priority for restoration and protection to support key surface water storage processes.	
	Slope wetlands could be targeted as highest priority for restoration and protection to support key discharge processes.	
Surface Water and Stormwater	Hillside seeps and slope wetlands along ravines are important for baseflow.	Surface Water Monitoring Program functioning overall as designed; successful in determining land use and water quality issues. Improvements could be made to program for water quantity monitoring, monitoring locations, monitoring parameters, use of available spatial analysis, and improved reporting.
	Sediment export potential and phosphorous export potential could be considered in identifying areas at risk of erosion during updates to management standards and monitoring programs.	
Groundwater Resources	Areas with existing impervious land cover limit infiltration to groundwater resources	Groundwater Quality Monitoring Program finds that nitrate concentrations greater than the state drinking water standard of 10mg/L NO3-N are uncommon and typically limited to relatively small areas of the County. Monitoring results indicate that areas with higher aquifer transmissivity and/or more significant groundwater withdrawals may be present in low-elevation areas extending farther inland.
	Low-gradient, riverine floodplain areas are sparse in the County and represent important areas for surface runoff and groundwater infiltration.	
Geologically Hazardous Areas	Ecology's water flow assessment for discharge processes could be useful tool for identifying where shallow groundwater is reaching steep slopes.	Not applicable.
	Ecology's water quality assessment results for sediment export potential could be helpful for identifying where increased surface runoff could result in increased coastal bluff erosion.	

DRAFT

Appendix B - References

Adamus, P.R. 2006. Wetlands of Island County, Washington Profile of Characteristics, Functions, and Health. Prepared for Island County Department of Planning and Community Development. August 2006. Available at: https://www.islandcounty.net/planning/criticalareas/wetlands/Phase1_Complete-doc.pdf.

Adamus, P. R. 2007. Best Available Science for Wetlands of Island County, Washington: Review of Published Literature. A Report Prepared in Response to Critical Areas Ordinance Updating Requirements for Wetlands. Prepared for Island County Department of Planning and Community Development. May 2007. Available at: https://www.islandcounty.net/planning/documents/Nov07BestAvailableScience_001.pdf.

Berk Consulting, The Watershed Company, and Parametrix. 2014. Island County Fish and Wildlife Habitat Conservation Areas Audit and Policy / Regulation Framework. March 2014. Available at: http://www.islandcounty.net/planning/documents/2-AuditPolicy-Clean-PC-3-25-2014.pdf.

Corps and EPA (U.S. Army Corps of Engineers and US Environmental Protection Agency). 2008. Compensatory Mitigation for losses of Aquatic Resources; Final Rule. Federal Register 73(70): 19594-1970.

ESA (Environmental Science Associates), PGG (Pacific Groundwater Group), and Stratum Group. 2015a. Island County Critical Areas Ordinance Update – Existing Conditions Report. Prepared for Island County, August 2015.

ESA (Environmental Science Associates), PGG (Pacific Groundwater Group), and Stratum Group. 2015b. Island County Critical Areas Ordinance Update – Best Available Science Report. Prepared for Island County, September 2015.

GeoEngineers. 2015. Letter Report: Task No. 00898 - Geologically Hazardous Area Review and Update. Prepared for Island County, Public Works Department. March 2015.

Goforth, G. 2015. Assistant Critical Areas Planner, Clean Water Utility Island County Planning and Community Development Department. Personal communication with Ilon Logan of Environmental Science Associates, May 2015 and July 2015.

Hruby, T. 2012. Calculating Credits and Debits for Compensatory Mitigation in Wetlands of Western Washington. Washington State Department of Ecology. Publication No. 10-06-011. March 2012. Available at: https://fortress.wa.gov/ecy/publications/publications/1006011.pdf.

Island County. 2005a. Seawater Intrusion Topic Paper. Island County Water Resource Management Plan. March 2005. Island County, WA. Editor: Doug Kelly.

Island County. 2005b. Island County Water Resource Management Plan. Island County, WA. June 2005. Available at: http://www.islandcountyeh.org/Uploads/FKCEditor/file/Final%20Plan.pdf.

Kelly, D. 2015. Hydrogeologist, Island County Public Health Department. Personal communications with Peter Schwartzman of Pacific Groundwater Group, 2015.

DRAFT

Stanley, S., S. Grigsby, D. B. Booth, D. Hartley, R. Horner, T. Hruby, J. Thomas, P. Bissonnette, R. Fuerstenberg, J. Lee, P. Olson, George Wilhere. 2011. Puget Sound Characterization. Volume 1: The Water Resources Assessments (Water Flow and Water Quality). Washington State Department of Ecology. Publication #11-06-016. Olympia, WA. Available at: http://www.ecy.wa.gov/puget_sound/characterization/index.html

Technical Advisory Group (TAG) for Island County CAO Update. Meeting Notes. June 18, 2015; July 23, 2015; and, September 3, 2015. Prepared by Island County Planning & Development.

DRAFT