

Critical Areas Monitoring and Adaptive Management Program Plan

June 30, 2025



King County

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II. Proviso Text

Ordinance 19861, Section 16, Office of Performance, Strategy, and Budget, P1¹

P1 PROVIDED THAT:

Of this appropriation, \$100,000 shall not be expended or encumbered until the executive transmits a Critical Areas Monitoring and Adaptive Management Program plan and a motion that should acknowledge receipt of the plan, and a motion acknowledging receipt of a plan is passed by the council. The motion should reference the subject matter, the proviso's ordinance, ordinance section, and proviso number in both the title and body of the motion.

The plan shall include, but not be limited to, discussion and analysis of what would be needed to develop and implement a critical areas monitoring and adaptive management program consistent with guidance from Washington State Department of Commerce in chapter 7 of the critical areas ordinance handbook. Accordingly, the plan should address three types of monitoring: permit implementation, effectiveness, and ecological validation. Specifically, the plan shall include:

- A. An analysis of the one-time monetary and staffing resources needed to develop the program;
- B. An analysis of the ongoing monetary and staffing resources needed to implement the program;
- C. Based on the needs analysis completed in response to subsections A. and B. of this proviso, a detailed timeline for developing and implementing the program;
- D. An analysis of whether all permits and critical areas or a subset of permits and critical areas should be monitored through the program; and
- E. An analysis of how phasing implementation of the program, such as applying it to streams and wetlands first, and to other types of critical areas later, would impact the needed resources and the timeline, as well as any impacts to the environment that might result from phasing the work.

The executive should electronically file the plan and a motion required by this proviso by June 30, 2025, with the clerk of the council, who shall retain an electronic copy and provide an electronic copy to all councilmembers, the council chief of staff, and the lead staff for the local services and land use committee or its successor.

¹ [Link to Ordinance 19861](#)

III. Executive Summary

This report responds to Ordinance 19861, Section 16, prepared by the King County Office of Performance, Strategy and Budget (PSB), the Department of Natural Resources and Parks (DNRP) Water and Land Resources Division (WLRD), and the Department of Local Services (DLS) Permitting Division. The content includes a discussion and analysis of what would be needed to develop and implement a critical areas monitoring and adaptive management program consistent with guidance from the Washington State Department of Commerce in Chapter 7 of the Critical Areas Ordinance Handbook.

Background

- Office of Performance, Strategy and Budget (PSB): PSB is the central authority for planning, management, and performance oversight.
- Department of Natural Resources and Parks (DNRP) Water and Land Resources Division (WLRD): DNRP actively protects the county's water and land resources.
- Department of Local Services (DLS) Permitting Division: DLS-Permitting provides comprehensive land use planning and rigorous permit review across rural and urban unincorporated areas, focusing on critical areas.

King County's history of environmental regulation is rooted in progressive policies. Pre-dating the Growth Management Act (GMA), the County initially adopted the Sensitive Areas Ordinance in 1979, which evolved into the Critical Areas Ordinance (CAO) with significant revisions in the 1980s, 1990, and again in 2004. Present-day efforts within DNRP and DLS-Permitting aim to evaluate permit implementation, ecological validation, and trend assessments. Integrating and expanding these efforts would inform adaptive management actions, ensuring that regulations effectively safeguard ecosystems, public health, and long-term sustainable development.

The Washington State Department of Commerce outlines how to develop and implement a monitoring and adaptive management program in Chapter 7 of the Critical Areas Handbook. In short, a successful program integrates three core monitoring elements — permit implementation, permit effectiveness, and ecological validation — to diagnose and address gaps in critical area protection. Each monitoring component informs adaptive management actions that drive continuous improvement.

This program plan focuses on unincorporated King County at a level of detail between conceptual planning and 30 percent design, leaving the rest to be fleshed out during the development of a program. This planning-level analysis outlines both one-time monetary and staffing resource commitments necessary to design and implement the program.

At its core, the program would integrate multiple monitoring components, including permit implementation monitoring, permit effectiveness monitoring, and ecological validation monitoring. The integration of these monitoring elements is intended to provide continuous data-driven evaluations of whether permitted projects are carried out in accordance with regulations and whether the critical area functions and values are maintained over time. The program could operate on a five-year cycle, aligning with other essential cycles, such as biennial budget cycles, five-year National Pollutant Discharge Elimination System (NPDES) permit reviews, and ten-year Comprehensive Plan (Comp Plan) updates.

This synchrony could minimize budgetary volatility and staffing disruptions, thereby ensuring the consistent execution and reporting of monitoring activities.

Report requirements:

A. An analysis of the one-time monetary and staffing resources needed to develop the program;

Overall, the planning-level estimate to develop the program sums to nearly 16,000 labor hours and a labor cost of approximately \$1.4 million for the different monitoring activities, highlighting the significant commitment of staff time across various categories. Although no additional one-time monetary expenditures beyond labor are projected, the one-time staffing resource requirements are detailed for each major task.

Task 1: Develop Permit Implementation Monitoring: Task 1 focuses on building a system that verifies that permits are issued in compliance with existing code and regulations and that projects, as built, adhere to the conditions set by these permits. This task, led by DLS-Permitting with DNRP support, is estimated to require one-time staffing resources of \$482,000 over a two-year development phase.

Task 2: Develop Permit Effectiveness Monitoring: Task 2 seeks to develop systems that ensure ongoing compliance after permits have been issued and monitored. With DLS-Permitting taking the lead and DNRP supporting, Task 2 is projected to require one-time staffing resources of \$290,000 over a two-year development period.

Task 3: Develop Ecological Validation Monitoring: Task 3 is dedicated to developing systems for verifying that the ecological functions and values of critical areas are being protected. WLRD leads this effort with support from DLS-Permitting and estimates one-time staffing resources of \$374,000 over a two-year period.

Task 4: Develop Adaptive Management: Task 4 establishes a framework for prioritizing and implementing recommendations from permit implementation, permit effectiveness, and ecological validation monitoring. The goal is to ensure that permits are issued and executed in accordance with regulations, that projects meet ongoing permit conditions, and that County actions achieve no net loss of critical area values and functions. Led by DLS-Permitting with WLRD support, this initiative requires a one-time staffing investment of \$286,000, with no additional monetary costs.

In summary, while no extra nonlabor monetary costs are anticipated, the successful development of this program will require a collective one-time staffing investment of approximately \$1.4 million.

B. An analysis of the ongoing monetary and staffing resources needed to implement the program;

This analysis outlines the ongoing monetary and staffing resources required to implement a comprehensive monitoring and adaptive management program for King County's critical areas. Developed at a planning level with built-in subtask contingencies, these estimates provide a framework for one complete implementation cycle (e.g., repeated once every five years).

Task 1 – Implement Permit Implementation Monitoring: This task focuses on verifying that permits accurately reflect current code requirements and that project as-built conditions comply with permit conditions. The ongoing resource needs are modest in monetary terms — \$10,000 per cycle — but substantial in labor, with staffing resources estimated at approximately \$1.5 million per cycle. Total cost is approximately \$1.5 million.

Task 2 – Implement Permit Effectiveness Monitoring: This element ensures that, after the initial permitting phase, projects continue to meet established requirements over time. Led primarily by DLS-Permitting — with WLRD taking responsibility for monitoring frequently flooded areas — this task demands ongoing monetary costs of about \$450,000 per cycle and staffing resources close to \$967,000. Total cost is approximately \$1.4 million.

Task 3 – Implement Ecological Validation Monitoring: Task 3 evaluates whether critical area functions and values are maintained at both the permit and countywide scales. This task, led by WLRD with support from DLS-Permitting, carries ongoing monetary costs of about \$350,000 per cycle and requires staffing resources estimated at \$1.6 million. Total cost is approximately \$2 million.

Task 4 – Implement Adaptive Management Actions: The final task implements the recommendations generated from the monitoring activities. Short-cycle adaptive management actions require approximately \$1 million in monetary resources for mapping, and \$955,000 in staffing resources per cycle. Total cost is approximately \$2 million. The 10-year strategic updates — such as those for Best Available Science (BAS), the CAO, and comprehensive resource mapping — entail an additional \$360,000 in nonlabor and approximately \$2.63 million in labor per cycle. Total cost is approximately \$3 million. Combining the routine costs of this task (\$2 million) with the 10-year cycle for strategic updates (\$3 million) results in a total cost of \$5 million.

Overall, ongoing implementation of the program demands significant resource commitments totaling \$6.6 million. Aggregated costs across tasks not only reflect substantial annual staffing investments (\$4.8 million) but also encompass targeted monetary expenditures (\$1.8 million) necessary to drive comprehensive environmental oversight.

C. Based on the needs analysis completed in response to subsections A. and B. of this proviso, a detailed timeline for developing and implementing the program;

This section outlines a detailed timeline and strategic analysis for developing and implementing King County’s integrated monitoring and adaptive management program for critical areas.

Development Phase: During the initial development phase, as set out in Table 2, planning-level deliverables could be scheduled to be completed in the 2028-29 biennium. This phased schedule ensures that, by the end of the development period, all foundational systems and protocols are in place.

Implementation Phase: Following development, Table 3 details a planning-level timeline for the ongoing implementation of the monitoring and adaptive management program, assumed to operate indefinitely in repeated cycles (e.g., five and 10 years). Each task’s deliverables are

scheduled across biennia, ensuring coordinated progression from development to full implementation. The proposed timeline sets forth a stepwise approach: initial development during 2028-29, followed by a shortened test cycle to align reporting with other key efforts (i.e., the Comp Plan), then perpetual cyclic implementation, ensuring continuous improvement.

D. An analysis of whether all permits and critical areas or a subset of permits and critical areas should be monitored through the program;

Priority permits and critical areas:

The Critical Areas Handbook advises that no single approach fits every community and recommends enhanced monitoring and adaptive management when a jurisdiction deviates from BAS or when information is inadequate. A key insight from King County’s 2024 Best Available Science Report is the opportunity for enhanced protections for riparian and wetland areas due to departures from BAS. Although the 2025 CAO update proposed increased protections for these areas, certain County proposals have intentionally deviated from BAS to also meet additional GMA goals. Such departures may carry a heightened risk of adverse impacts on riparian and wetland environments. The analysis concludes that these areas should be prioritized. Permits that most impact riparian areas and wetlands — such as clearing and grading, building, and commercial/industrial permits — are identified as the primary candidates for monitoring.

In contrast, literature reviewed during the 2024 BAS update revealed that the science underlying geologically hazardous and frequently flooded areas, critical aquifer recharge areas, and non-riparian Fish and Wildlife Habitat Conservation Areas (FWHCAs) remains largely unchanged from previous assessments, indicating that existing regulations closely align with BAS and continue to provide adequate protection. These areas are recommended to be deprioritized.

E. An analysis of how phasing implementation of the program, such as applying it to streams and wetlands first, and to other types of critical areas later, would impact the needed resources and the timeline, as well as any impacts to the environment that might result from phasing the work.

A phased approach is recommended to optimize resource use and technical expertise. This staggered rollout minimizes up-front costs and resource demands while leveraging existing expertise and data. Initially applying the program to streams, riparian, and wetland areas will address the most vulnerable and high-risk zones. Monitoring these areas can yield a range of positive outcomes: enhanced protection of fragile ecosystems, improved education for permit applicants, streamlined permitting processes, and more-effective data collection for mitigation monitoring. The benefits associated with such improvements plausibly justify the allocation of resources. Additionally, delaying monitoring implementation for geologically hazardous and frequently flooded areas, critical aquifer recharge areas, and non-riparian FWHCAs — where protection measures are already robust — will likely have minimal additional environmental impact due to current restrictions and hazard and migration mapping.

By focusing on permits with the most significant impact on riparian and wetland areas — such as clearing and grading, building, and commercial/industrial permits — King County can attain a more cost-effective and impactful monitoring program.

Conclusions and Future Actions

This report outlines a Critical Areas Monitoring and Adaptive Management Program plan for King County that aligns with the Washington State Department of Commerce Critical Areas Handbook and advances Comp Plan policies as well as County Code directives. It lays out evidence-based, cyclical recommendations (e.g., every five and 10 years) to continuously improve permitting and protection processes by upgrading the permit tracking system and extending and integrating monitoring efforts across departments. It also proposes a phased approach, targeting wetlands and riparian areas that minimizes disruptions to existing work programs. Ultimately, it supports integrated, outcome-driven environmental stewardship across multiple critical areas.

Total Development Costs: The estimated labor cost to develop the program is \$1.4 million over two years, with no monetary resource required unless the labor was performed by consultants instead of King County staff.

Total Implementation Costs: The estimated labor cost to implement one five-year cycle of monitoring and adaptive management is \$6.6 million, with an additional cost of \$3 million every 10 years. Over a 10-year period, completing five-year tasks two times and 10-year cycle tasks once, the total cost of the program would be \$16.2 million, or approximately \$1.62 million per year or \$3.24 million per biennium.

IV. Background

Department Overview:

This report was prepared by the Office of Performance, Strategy and Budget (PSB), the Department of Natural Resources and Parks (DNRP) Water and Land Resources Division (WLRD), and the Department of Local Services (DLS) Permitting Division.

The King County PSB provides comprehensive planning, management, budgeting, and performance assessment for King County government. PSB's work is guided by best practices in financial stewardship and performance management, which includes enhancing accountability and transparency, and integrating strategic planning, business planning, resource allocation, and continuous improvement into a systematic approach throughout the county. The office includes the Regional Planning section, which works with County agencies to support King County communities through equitable, comprehensive, countywide, and regional planning.

DNRP employs scientists, engineers, policy experts, ecologists, and project managers dedicated to protecting the health and integrity of King County's natural resources, so that they can be enjoyed today and for generations to come. As a department, DNRP protects and restores the natural environment for the people, fish, and wildlife of King County, promoting resilient, sustainable, equitable communities. DNRP restores habitat, builds and operates major infrastructure that protects Puget Sound, transforms waste management to reduce carbon emissions, and expands and enhances regional parks and trails, all of which contribute to the region's unique quality of life. WLRD safeguards King County's water and land resources by providing services that protect public health and safety and yield significant environmental benefits.

The DLS promotes the well-being of residents and communities in unincorporated King County by seeking to understand their needs and delivering responsive government services. DLS-Permitting provides land use planning services and development permit review to the residents of rural and urban unincorporated King County. Permitting services include building and land use permit review; this involves review of critical areas impacts when these areas are present on the subject properties.

Key Historical Context:

The state Growth Management Act (GMA) requires King County to designate and protect critical areas, which — together with Washington Administrative Code (WAC) provisions that implement the GMA — provide the basis and requirements for the County's current critical area regulations.^{2, 3} "Critical areas" include wetlands, areas with a critical recharging effect on aquifers used for potable water, fish, and wildlife habitat conservation areas (including riparian areas), frequently flooded areas, and geologically hazardous areas.⁴ Protecting critical areas protects public health and safety (e.g., from hazards like

² RCW 36.70A.060(2), <http://app.leg.wa.gov/RCW/default.aspx?cite=36.70A.060>

³ RCW 36.70A.170, <https://app.leg.wa.gov/RCW/default.aspx?cite=36.70A.170>

⁴ RCW 36.70A.030(11), [RCW 36.70A.030: Definitions.](#)

floods and landslides), protects environmental quality (e.g., clean water for swimming or drinking) and benefits the economy through resource industries like salmon and shellfish harvesting.⁵

King County has a long history of implementing development regulations that protect the environment, which predates the GMA. The precursor to the Critical Areas Ordinance (CAO) was the Sensitive Areas Ordinance (SAO), first adopted by the County in 1979 and implemented in 1983, with substantial revisions completed in 1990.^{6,7} The County substantively updated its regulations again to adopt the CAO in 2004.⁸

According to Commerce's Critical Areas Handbook, a monitoring and adaptive management (M&AM) program is required only when risks to critical areas are largely unknown or, in some circumstances, when regulations deviate from BAS. Where required, Commerce notes the need for a permit monitoring system to ensure permits were issued and implemented correctly and consistently and to determine whether ecological losses are due to problems with local regulations. A monitoring and adaptive management program provides a method for verifying that critical areas regulations and complementary programs are achieving no net loss of ecological function, which is required by WAC 365-196-830.⁹ Critical areas monitoring is also supported by policies and code adopted by the County. King County Comp Plan policies relating to monitoring and adaptive management include, but are not limited to, E-326, E-903, E-904, and I-202. These policies encourage, and sometimes require, making decisions (including how and whether to update code, policies, work program priorities, and resource allocation) based on the findings from critical areas monitoring. Critical areas monitoring is also required by K.C.C. 21A.24.515, which states: "The department of natural resources and parks, in consultation with the department [of local services], shall conduct monitoring to evaluate the effect of this chapter on protecting the functions and values of critical areas."¹⁰

Critical areas monitoring currently takes multiple forms. King County's permit implementation monitoring is currently done for issued permits where the cost of mitigation is over \$1,000. In these cases, DLS-Permitting requires the applicant to submit a financial guarantee, released when the applicant completes two components: 1) installation of mitigation (typically vegetation plantings); and 2) a three- to five-year maintenance period (which may be extended, under certain circumstances), during which the applicant monitors the health of the mitigation. Requiring a financial guarantee incentivizes landowners to successfully maintain required critical areas mitigation, promoting the successful implementation of critical areas code requirements to mitigate impacts.

King County's past adaptive management efforts based on permit implementation monitoring have included:

⁵ Critical Areas Handbook, <https://deptofcommerce.box.com/s/rlysjrfvrpxwnm9jvbc3lc7ji19ntp>

⁶ Ord. 4365, <https://aqua.kingcounty.gov/council/clerk/OldOrdsMotions/Ordinance%2004365.pdf>

⁷ Ord. 9614, <https://aqua.kingcounty.gov/council/clerk/OldOrdsMotions/Ordinance%2009614.pdf>

⁸ Ord. 15051, <https://mkcclegisearch.kingcounty.gov/LegislationDetail.aspx?ID=551895&GUID=12288D96-273A-426B-8589-A3BB68B9CD47&Options=Advanced&Search=&FullText=1>

⁹ WAC 365-196-830, <https://app.leg.wa.gov/wac/default.aspx?cite=365-196-830>

¹⁰ K.C.C. 21A.24.515, https://aqua.kingcounty.gov/council/clerk/code/24-30_Title_21A.htm#_Toc49425444

1. A 1998 study conducted by DLS-Permitting's predecessor agency, the Department of Development and Environmental Services, which examined sites on which critical areas mitigation had been installed following permit issuance. Findings and analysis from this study led to the development of new mitigation guidelines for permittee use.
2. A 2006 study of critical areas mitigation sites resulted in multiple recommendations to update workflow processes (such as identifying one approved site plan to be used for inspections, improving permit file management so that all relevant information could be located easily, and standardizing the language used in permit conditions) to improve outcomes.

For decades, King County has performed various forms of ecological validation monitoring, initially focused on understanding the net effect of wastewater and stormwater management. More recent efforts increasingly focus on understanding the effects of development and forest clearing. For example, King County performs status and trend monitoring that includes stream health (e.g., health of stream bug populations); water quality in streams, lakes, and Puget Sound; sediment quality; streamflow and temperature; aquatic food webs, and limited work on groundwater quality. In addition to monitoring programs, the County undertakes targeted studies focused on the causes of change in environmental conditions, particularly in streams and lakes. The County conducts flood hazard mapping (both riverine and coastal), assesses and develops strategies to address flood risk in repetitive-loss areas, and maps channel migration and landslide hazards. Finally, King County completed two time series studies of land cover change and environmental responses in nine lowland streams in rural, developing unincorporated King County. The first of these was primarily funded by an EPA grant. This study demonstrated the value of integrating permitting information with ecological monitoring to directly inform BAS and development regulations.

With some exceptions, the County's ecological validation (or status and trends) monitoring work was not originally designed to integrate with permit implementation and permit effectiveness monitoring. This is mostly because the majority of the funding originates from wastewater fees and because permit-related monitoring was insufficient. Consequently, executive department programs often provide broad insight into trends in environmental conditions. For example, DNR science staff know that stream health has been improving countywide over the last 20 years and that streams in watersheds developed more recently tend to stay healthier for a given level of development. At the same time, monitoring and recent mapping efforts continue to show ongoing degradation of riparian areas and wetlands in King County. DNR has used long-term monitoring datasets to inform and improve watershed models to find optimal locations and combinations of projects to make stormwater cleaner and more controlled. But when examining the effectiveness of regulations, science staff typically lack the diagnostic information needed to make specific recommendations for change. The previously mentioned time series studies aimed to address this gap, but the rate of development has been too slow to strongly test the hypothesis that the County's regulations protect streams from harm. This year, King County acted on lessons learned from recent studies by forming the Integrated Streams Program. Many of the County's stream monitoring programs were built in isolation, so the data was not collected in the same places and times. The Integrated Streams Program addresses these shortcomings by consolidating the County's various monitoring efforts at the same set of locations. This simple change will enable the County to better diagnose and explain the changes staff observe and make specific and actionable

recommendations. In addition, project-focused effectiveness monitoring has provided numerous specific recommendations that have improved the design and maintenance of capital projects.

Key Current Context:

The Department of Commerce, which assists local governments with meeting GMA requirements, provides guidance on designing and implementing monitoring and adaptive management programs in its Critical Areas Handbook, published in 2023.¹¹ The budget proviso request specifically refers to this document, stating: “The plan shall include, but not be limited to, discussion and analysis of what would be needed to develop and implement a critical areas monitoring and adaptive management program consistent with guidance from Washington State Department of Commerce in chapter 7 of the critical areas ordinance handbook.”¹²

Components of monitoring and adaptive management, as discussed in chapter 7 of the handbook, include the following components:

1. **Monitoring**, which is broken down into three elements:
 - a. Permit Implementation monitoring, which confirms that: 1) permits are issued consistent with adopted regulations and policies, and 2) projects, as built, comply with the issued permit.
 - b. Permit Effectiveness monitoring, which the Critical Areas Handbook describes as ensuring that regulations are implemented consistently over time. This may address compliance issues (i.e., checking to see if permittees made unpermitted changes after DLS-Permitting staff completed their inspections).
 - c. Ecological validation monitoring, which evaluates critical areas functions and values at a county, watershed, and/or regional scale, demonstrating the aggregate effect of property-by-property changes.
2. **Adaptive management**, which involves acting on the results of monitoring and addressing any weaknesses found by the monitoring. The specific adaptive management measure would depend on the findings of the monitoring. Examples of adaptive management measures could include: creating a revised training program for staff to promote consistent application of the County’s code; educating applicants and property owners about permit processes; improving the application process and forms; improving the monitoring reporting process, or updating development regulations.¹³

All three elements of monitoring are important for determining the appropriate adaptive management measures. The need for some types of adaptive management might be apparent with, for example, solely permit implementation monitoring, which provided valuable insights, as shown in the 1998 and 2006 DLS predecessor agency studies. Other issues need all three elements to diagnose them. To give a hypothetical example, if permit implementation monitoring were to show high rates of applicant compliance with issued permits, but ecological validation monitoring showed declining ecological

¹¹ Critical Areas Handbook, <https://deptofcommerce.box.com/s/rlysjrfvrpxwnm9jvbcd3lc7ji19ntp>

¹² Ordinance 19861, lines 96-99, <https://mkcclegisearch.kingcounty.gov/LegislationDetail.aspx?ID=6872221&GUID=984B4D1E-D397-4497-85A8-C886918ED955&Options=Advanced&Search=&FullText=1>

¹³ Critical Areas Handbook, <https://deptofcommerce.box.com/s/rlysjrfvrpxwnm9jvbcd3lc7ji19ntp>

health, it would not be apparent what the adaptive management measures should be. Possible reasons for declining ecological health could be: 1) code standards that were insufficiently protective, or 2) work being done by property owners without permits. In this example, permit effectiveness monitoring would provide the key information needed to diagnose the root problem, and therefore the appropriate adaptive management measure. King County is currently only conducting a small portion of this monitoring and most of the County's permit information is not digitized in electronic maps, which makes analysis of trends very difficult.

Report Methodology:

This report was compiled by PSB, in coordination with WLRD and DLS-Permitting. A core team of staff from WLRD and DLS-Permitting reviewed chapter 7 of the Department of Commerce's Critical Areas Handbook, referenced in the proviso text, to provide the basis for a desired end state that would be consistent with this guidance, as required by the proviso, together with existing Comp Plan policies and King County Code provisions.

The core team then reviewed existing monitoring and adaptive management actions already being done by WLRD and DLS-Permitting (the divisions responsible for critical areas monitoring work) by surveying frontline staff on existing workflows. Comparing the desired end state with existing workflows revealed where there were opportunities to add discrete program elements that would create a critical area monitoring and adaptive management program consistent with the Critical Areas Handbook. Frontline staff were further surveyed to identify known shortcomings of existing workflows, informing where effective investments of resources could be made to create an efficient monitoring and adaptive management program. The core team then developed cost estimates for the identified program elements in consultation with the chief financial officers from WLRD and DLS-Permitting.

V. Report Requirements

Conceptually, a monitoring and adaptive management program resembles a three-legged stool; three types of monitoring inform adaptive management, forming an integrated whole.

- Each type of monitoring is a distinct, important leg of the stool. Monitoring compares actual outcomes to desired outcomes (or benchmarks). By diagnosing the causes or contributing factors to the gap between actual and desired conditions, the monitoring agency can recommend effective actions to improve outcomes.
- The seat embodies the most useful part of the program: adaptive management actions. The seat is what makes the three types of monitoring useful for continuous improvement. Adaptive management is a systematic way to turn the lessons learned or diagnostics into actions that improve outcomes.

The Critical Areas Handbook provides general guidance to local government. This includes a recommendation to include the three program components described in the Key Current Context section above, together with example methods of monitoring each type of critical area. A monitoring and adaptive management program could be tailored to both the need and resources available; however, the minimum level of effort necessary will vary across components.

The least scalable component of a monitoring and adaptive management program is probably the permit implementation monitoring. This type of monitoring requires a relatively high level of effort or investment to provide value, even when addressing a single critical area or a subset of critical areas. The other three components — permit effectiveness, ecological validation monitoring, and adaptive management — can provide value at multiple levels of effort or investment. For example, ecological validation monitoring could be as minimal as a desktop GIS analysis of free data to evaluate changes in landcover across a larger number of critical areas. However, more information may be needed for diagnosing and addressing problems with adaptive management actions.

The Critical Areas Handbook is clear that a functional program requires all four components. For this analysis, all components are assumed to be part of the monitoring and adaptive management program, but by targeting a subset of critical areas, the program could take various forms, significantly affecting the resources needed.

A. An analysis of the one-time monetary and staffing resources needed to develop the program

The following analysis assumes King County may choose to develop a monitoring and adaptive management program addressing all or some critical areas, at a level commensurate with guidance from the Critical Areas Handbook (Table 1).

The analysis is based on planning-level assumptions about the scope of a future program. These assumptions are informed estimates of the monetary and staffing resources needed to develop, implement, and operate the program. Using terminology from capital project work, the level of detail falls between “conceptual” and “30 percent design.” Accordingly, estimated costs include contingencies at the subtask level. If the County elects to develop a monitoring and adaptive management program, the team developing the program would add the necessary details to improve the precision and accuracy of the resource estimates presented here.

Though less important to the cost of developing a program, a primary driver of the total program cost will be the frequency of monitoring and reporting. The frequency, or cycle, of the program should consider the timing of several important factors:

- Two-year budget cycles: Matching the biennial budget cycle could simplify budgeting, staffing, and reporting, especially for funding sources that cannot be carried over to the next biennium.
- Five-year NPDES permit cycles and Surface Water Management fees: Every five years, Stormwater Services is required to evaluate changes in tree canopy and impervious surfaces. This is also required for surface water management fee analysis.
- Ten-year Comp Plan updates, which are required by the GMA:
- Ten-year updates for BAS and CAO, which are required by the GMA, and associated resource maps of streams, wetlands, etc.

King County operates on a biennial funding cycle, meaning that program budgets will be developed and approved once every two years. If the program instead were only activated once every three, five, or 10 years, this would cause high variability in budget needs among budget cycles and would create formidable gaps in staffing. However, the recommendation in this plan is to work on a five-year cycle, further detailed in Section C. of this report.

Table 1. Planning-level estimate of resources needed to develop a monitoring and adaptive management program for critical areas.

Category	Permit implementation monitoring	Permit effectiveness monitoring	Ecological Validation Monitoring	Adaptive Mgmt	Subtotals (labor hours)	Labor Cost
General	4,056	1,656	1,152	2,400	9,264	\$882,898
Wetlands	360	-	1,152	-	1,512	\$133,708
FWHCA (Aquatic & Riparian)	618	-	1,296	-	1,914	\$169,257
Frequently Flooded Areas	216	1,506	-	-	1,722	\$152,279
Critical Aquifer Recharge Areas	-	-	-	-	-	\$0
Geologic Hazard Areas	-	-	96	-	96	\$8,489
Shorelines	-	-	384	-	384	\$33,958
Subtotals (Labor Hours)	5,250	3,162	4,080	3,120	15,612	\$1,432,844
Labor Cost	\$ 481,836	\$ 290,203	\$ 374,456	\$ 286,349		

Task 1. Develop a system for permit implementation monitoring and adaptive management: Develop the capacity to determine whether permits correctly and consistently reflect code. Subtasks include:

- 1.1 Modify the existing permit tracker to enable a user to verify what was permitted.
- 1.2 Develop a protocol to determine whether issued permits were consistent with regulations and policies.
- 1.3 Develop a protocol to verify project as-builts complied with all conditions noted in the permit and deviations were approved and documented.
- 1.4 Develop or, when possible, use existing protocols for completing critical-areas-specific analyses.
- 1.5 Create a protocol and templates for analyzing and reporting the results.

Deliverables

- Improvements to existing permit tracking system. The improved system would provide users with information, through queries, on critical areas present, whether there were impacts or whether the work that was approved avoided onsite critical areas, and whether mitigation, restoration, or enhancement was required. The system would automatically trigger a flag for overdue mitigation reports. Users would be trained on these new capabilities
- Protocols for making GIS maps of permitted impacts and critical areas determinations, to be stored with site plan info in GIS layers and queried by a user

- GIS maps of critical areas boundaries and protocols to verify and validate them
- Protocols for annually verifying whether development occurring in frequently flooded areas is permitted and whether permitted projects follow permit conditions for elevations, setbacks, and similar variables
- Protocols and workflow for completing an internal audit based on a sample of approximately 50 permits, drawn at random, completed at a specified interval. The Critical Areas Handbook recommends a focusing on a “sample” of permits to represent the larger “population” of permits
- Protocols and workflows for completing critical-areas-specific analyses, and templates for creating a summary report including any audit findings and recommendations for adaptive management

Assumptions

- DLS-Permitting leads this task, DNRP supports
- Development/design costs are 30 percent of estimated implementation costs
- Developing the program requires two years

Resource needs

- Additional one-time monetary nonlabor costs: \$0
- Additional one-time staffing resources: \$482,000

Task 2. Develop system for Permit Effectiveness Monitoring: Develop a system for determining whether permitted projects continue to meet permit requirements after the monitoring period ends. Subtasks include:

- 2.1 Establish a protocol to verify the condition of a required mitigation in the period after the required monitoring by the applicant has ended.
- 2.2 Establish a protocol to determine whether critical areas were unexpectedly impacted in sites where they were to be avoided.
- 2.3 Create or, when possible, use existing protocols for analyzing and reporting the results.

Deliverables

- Protocols for completing an internal audit of approximately 50 permits, drawn at random, completed at a specified interval
- Updated protocols for mapping floodplains, floods, and flood damages; development trends; comparing observed coastal flooding to predictions; mapping high-water marks relative to 100-year recurrence intervals, channel migration zones (CMZs), urban flooding, and groundwater flooding
- Protocols and templates for creating a summary report, including audit findings and recommendations for adaptive management, issued every five years

Assumptions

- DLS-Permitting leads this task, which DNRP supports — with the exception of flood risk monitoring, which DNRP leads
- Development/design costs are 30 percent of estimated implementation costs

- Developing the program requires two years

Resource needs

- One-time monetary costs: \$0
- One-time staffing resources: \$290,000

Task 3. Develop system for Ecological Validation Monitoring: Determine whether critical areas functions and values are being protected in unincorporated King County and at the scale of individual permits for wetlands and riparian areas. Subtasks include:

- 3.1 Develop protocols to compare the extent of (percentage of area) and rate of change (acres/year) in forest cover and impervious surfaces within and outside critical areas.
- 3.2 Develop protocols to diagnose the root cause of change; permitted, unpermitted, or natural.
- 3.3 Make full use of existing ecological monitoring programs and adopt and train staff to use existing critical area specific protocols to assess impacts at approximately 50 randomly selected permit sites per critical area type.
- 3.4 For most critical areas that lack established protocols for assessing impacts, develop new ones, and train staff to use them.

Deliverables

- Protocols for mapping forest cover and impervious surfaces for unincorporated King County
- Maps of critical areas boundaries for unincorporated King County
- Protocols to estimate percent cover for each landcover type; rate of change in forest cover and impervious surfaces since last assessment for unincorporated King County, plus assessment of the causes of landcover change
- Protocols and templates for assessing permit-scale estimates of impacts to critical areas (i.e., authorized and unauthorized projects and their cumulative impacts)

Assumptions

- WLRD leads this task, DLS-Permitting supports
- Development/design costs are 30 percent of estimated implementation costs
- Developing the program requires two years

Resource needs

- One-time monetary costs: \$0
- One-time staffing resources: \$374,000

Task 4. Develop system for Adaptive Management: Develop a framework for prioritizing and implementing recommendations from permit implementation, permit effectiveness, and ecological validation monitoring. Propose and test improvements designed to ensure permits implement code accurately and consistently, that permitted projects continue to meet requirements over time, and that County actions effectively meet no net loss of critical area values and functions. Subtasks include:

- 4.1 Develop a framework for implementing improvements to internal processes and resources.
- 4.2 Identify ways to prevent or address unpermitted development through enforcement.

- 4.3 Identify options for addressing compliance issues and improve procedures to make permitting processes more efficient.
- 4.4 Identify options for programmatic actions to correct unforeseen losses, voluntary restoration to offset losses, and update or replace Best Management Practices (BMPs), which are the most effective and practical methods for preventing or reducing pollutants from non-point sources.

Deliverables

- Viable framework for implementing improvements internally
- Options for addressing problems with noncompliance
- Options for deploying programmatic actions and offsets

Assumptions

- DLS-Permitting leads this task, WLRD supports
- Adaptive management actions are refreshed on a five-year cycle, implementation of recommendations is ongoing
- Adaptive management based on Ecological Validation Monitoring is timed to inform each GMA-required 10-year BAS/CAO update, as well as interim monitoring to evaluate progress and potential updates between 10-year updates

Resource needs

- One-time monetary costs: \$0
- One-time staffing resources: \$286,000

B. An analysis of the ongoing monetary and staffing resources needed to implement the program

Planning level assumptions about the scope of a future program informed estimates of the monetary and staffing resources needed to develop, implement, and operate the program. The estimates apply contingencies at the subtask level. If the County elects to develop a monitoring and adaptive management program, the team developing the program would add the necessary details to improve the precision and accuracy of the resource estimates presented here (Table 2).

Table 2. Estimated resources needed to implement one 5-year cycle of a monitoring and adaptive management program. Costs can be annualized by dividing total costs by the number of years between cycles.*

Category	Permit implementation monitoring		Permit effectiveness monitoring		Ecological Validation Monitoring		Adaptive Management		Subtotal Labor	Labor Cost	Nonlabor Cost	All Costs
	Labor	Nonlabor	Labor	Nonlabor	Labor	Nonlabor	Labor (short cycle)	Nonlabor				
General	13,520	\$10,000	5,520	0	3,840	\$300,000	10,400		33,280	2,942,992	310,000	\$3,252,992
Wetlands	0	0	n/a	n/a	3,840	\$50,000			3,840	339,576	50,000	\$389,576
FWHCA (Aquatic & Riparian)	2,060	0	n/a	n/a	4,320	0			6,380	564,191	0	\$564,191
Frequently Flooded Areas	720	0	5,020	450,000	0	0		\$1,000,000	5,740	507,595	\$1,450,000	\$1,957,595
Critical Aquifer Recharge Areas	0	0	n/a	n/a	3,840	0			3,840	339,576	0	\$339,576
Geologic Hazard Areas	0	0	n/a	n/a	320	0			320	28,298	0	\$28,298
Shorelines	0	0	n/a	n/a	1,280	0			1,280	113,192	0	\$113,192
Subtotal Labor	16,300		10,540		17,440		10,400*		54,680*	\$4,835,421*	\$1,810,000*	\$6,645,421*
Labor Cost	\$1,495,987		\$967,344		\$1,600,615		\$954,495*					
Nonlabor Cost		\$10,000		\$450,000		\$350,000		\$1,000,000*				
All Costs		\$1,505,987		\$1,417,344		\$1,950,615		\$1,954,495*				

* Adaptive management tasks do not include long-cycle efforts, such as comprehensive review and updates to BAS, Comprehensive Plan, CAO, resource maps and the like; estimated total cost for long-cycle adaptive management is an additional \$3 million per 10-year cycle; \$2.6 million in labor and \$360,000 in monetary costs.

Task 1. Perform Permit implementation monitoring: Determine whether permits correctly and consistently reflect code, with special emphasis on wetlands and riparian areas. Subtasks include:

- 1.1. Verify what was permitted.
- 1.2. Determine whether issued permits were consistent with regulations and policies.
- 1.3. Verify project as-builts complied with all conditions noted in the permit and that deviations were approved and documented.
- 1.4. Complete critical-areas-specific analyses.
- 1.5. Analyze and report the results.

Outcomes and Deliverables

- Tracking system that provides users with information, through queries, on the type of critical areas present, whether mitigation, restoration, or enhancement was required, and indicates whether there were impacts or whether the work that was approved avoided onsite critical areas
- For each critical area, perform internal audit of approximately 50 permits, drawn at random, completed at a specified interval
- Summary report including audit findings and recommendations for adaptive management, issued on a five-year cycle

Assumptions

- DLS-Permitting owns this task
- Action steps to develop the program have already been completed

Resource needs

- Ongoing monetary costs: \$10,000 per cycle
- Ongoing staffing resources: \$1.51 million per cycle

Task 2. Perform Permit Effectiveness Monitoring: Determine whether permitted projects continue meeting permit requirements after the monitoring period ends. Subtasks include:

- 2.1. Verify condition of required mitigation in the period after the required monitoring by applicant has ended.
- 2.2. Determine whether critical areas were unexpectedly impacted in sites where they were intended to be avoided.
- 2.3. Analyze and report the results.

Outcomes and Deliverables

- For each critical area, complete an internal audit of approximately 50 permits, drawn at random, completed at a specified interval. For example, half of these would be permits with mitigation periods that ended in the last year permit effectiveness monitoring was analyzed
- Maps of flood damages, CMZs, and urban flooding
- Summary report including audit findings and recommendations for adaptive management, issued at the end of each five-year cycle

Assumptions

- DLS-Permitting owns this task, with the exception of Frequently Flooded Areas to be led by WLRD
- Action steps to develop the program have already been completed

Resource needs

- Ongoing monetary costs: \$450,000 per cycle
- Ongoing staffing resources: \$967,000 per cycle

Task 3. Perform Ecological Validation Monitoring: Determine the degree to which critical area functions and values are being protected, at the scale of unincorporated King County and at the scale of individual permits for wetlands and riparian areas. Subtasks include:

- 3.1. Compare the extent of (percentage of area) and rate of change (acres/year) in forest cover and impervious surfaces within and outside critical areas, and other useful comparisons.
- 3.2. Diagnose the root cause of change; permitted, unpermitted, or natural.
- 3.3. Assess impacts to each critical area and their buffers, where applicable, at 50 randomly selected permit sites.
- 3.4. Assess trends in overall stream health, water quality, and riparian conditions through the County's Integrated Streams Program.

Deliverables

- Map of forest cover and impervious surfaces for unincorporated King County; geographic extent to be determined during program development
- Maps of critical area boundaries and their buffers
- Estimated percent cover for each landcover type; rate of change in forest cover and impervious surfaces since last assessment, plus assessment of the causes of landcover change
- Permit-scale estimates of impacts to critical areas and their buffers
- Status and trends of in-stream health, water quality, and riparian condition at a representative sample of stream sites and marine shorelines

Assumptions

- WLRD leads this task, DLS-Permitting supports
- Integrated Streams Program continues at the current level of effort and scope; DLS gets four new inspectors in 2026, not included in this estimate

Resource needs

- Ongoing monetary costs: \$350,000 per cycle
- Ongoing staffing resources: \$1.95 million per cycle

Task 4. Perform Adaptive Management: Implement recommendations from permit implementation, permit effectiveness, and ecological validation monitoring. Make improvements to ensure that permits implement code accurately and consistently, that permitted projects continue to meet requirements over time, and that County actions effectively meet no net loss of critical area values and functions. Subtasks include:

- 4.1. Implement improvements to internal processes and resources.

- 4.2. Prevent or address unpermitted development through enforcement.
- 4.3. Address compliance issues and improve procedures to make permitting processes more efficient.
- 4.4. Establish programmatic actions to correct unforeseen losses, voluntary restoration to offset losses, and update or replace BMPs.
- 4.5. On five-year cycle, update floodplain maps; update CAO codes, if warranted.
- 4.6. On 10-year cycle, update BAS and revise CAO codes and policies; update stream and wetland maps.

Outcomes and Deliverables

- Improved permit process, staff training, applicant education, permit monitoring, establish new permits for monitoring mitigation, and similar
- Improved enforcement of existing codes and regulations
- Improved compliance with mitigation conditions
- Improved data to inform updates to BAS and CAO codes and policies
- Routinely updated resource maps

Assumptions

- Adaptive management actions are refreshed on a five-year cycle, implementation of recommendations is often ongoing, and each department takes the lead on actions in their respective departments.

Resource needs

- Ongoing monetary costs:
 - Subtasks 4.1-4.5: \$1 million per five-year cycle
 - Subtask 4.6b: \$360,000 per 10-year cycle
- Ongoing staffing resources:
 - Subtasks 4.1-4.5: \$700,000 per five-year cycle
 - Subtask 4.6: \$2.63 million per 10-year cycle

C. Based on the needs analysis completed in response to subsections A and B of this proviso, a detailed timeline for developing and implementing the program

The detailed timeline for developing and implementing a monitoring and adaptive management program follows. In the first table, planning-level estimated completion dates are listed for deliverables produced by completing the tasks described above (Table 3).

Table 3: Planning-level timeline for developing monitoring and adaptive management program. Shading indicates work is underway; X indicates the biennium in which deliverables would be complete.

Task	Name	Deliverable	26/27
1	Develop Permit Implementation monitoring	Improvements to permit tracker	X
		Protocols for internal audit	X
		Protocols for reporting	X
2	Develop Permit effectiveness monitoring	Protocols for internal audit	X
		Protocols for reporting	X
3	Develop Ecological validation monitoring	Protocols for mapping landcover, flood damages	X
		Critical area boundaries (GIS)	X
		Protocols for rates and causes of landcover change	X
		Protocols and templates for assessing permit scale impacts per critical area	X
		Protocols for reporting	X
4	Develop Adaptive Management	Framework for implementing recommendations	X
		Options for addressing noncompliance	X
		Options for informing programmatic actions	X

The next table follows the same format as above but presents a detailed schedule for the deliverables produced by implementing the monitoring and adaptive management program (Table 4).

Table 4: Planning-level timeline for implementing the monitoring and adaptive management program, assuming the program continues indefinitely. Cycle 1 would need to be shortened to align with Comp Plan timing in later years but, starting in Cycle 2, each would last five years, with the 10-year tasks happening every other cycle.

Task	Name	Deliverable	'28	'29	'30	'31	'32	'33	'34	'35
			Cycle 1 (test)			Cycle 2 (5 year)				
1	Perform Permit Implementation monitoring	Query necessary info from tracker	X	X		X	X			
		Internal audit completed		X			X			
		Summary report issued			X					X
2	Perform Permit effectiveness monitoring	Internal audit completed		X		X	X	X	X	
		Summary report issued			X					X
3	Perform Ecological validation monitoring	Landcover, flood maps		X			X			
		Updated critical area boundaries		X				X		
		Landcover change results		X				X		
		Permit-scale results for selected critical areas	X	X				X		
		Integrated Streams Program & Shorelines		X					X	
		Summary report issued			X					X
4	Perform Adaptive management	Permitting improvements				X	X			
		Enforcement improvements				X	X			
		Compliance improvements				X	X			
		Updated resource maps						X		
		Updated BAS, CAO, Comp. Plan				X	X	X	X	
		Adopt Comp Plan							X	

D. An analysis of whether all permits and critical areas or a subset of permits and critical areas should be monitored through the program

As explained by the Critical Areas Handbook, there is “no single best approach to critical areas protection for all communities,” therefore the Handbook’s recommendations are not mandatory. Jurisdictions must choose the best approach to apply and be sure it is consistent with GMA and the policies of that jurisdiction. King County's policies contained in the Comp Plan, and policies relating to monitoring and adaptive management, encourage: conducting environmental monitoring and assessment to track changes to environmental quality indicators in order to evaluate the effectiveness of County policies and regulations; utilizing data from monitoring to inform adaptive management

measures; and updating regulations to enhance their effectiveness in protecting and restoring habitat.¹⁴ Additionally, there is a code requirement to "conduct monitoring to evaluate the effect of [K.C.C. Chapter 21A.24] on protecting the functions and values of critical areas."¹⁵

The analysis falls into several categories, including departures from BAS, feasibility, and cost-benefit.

Departures from Best Available Science

The Critical Areas Handbook recommends monitoring and adaptive management "in cases of deviation from best available science or inadequate information." King County's October 2024 Best Available Science Report identified riparian areas and wetlands as needing increased regulatory protections to meet BAS. Though increased riparian and wetland protections were proposed in the 2025 CAO update, in some instances, the County proposed to deviate from BAS to meet additional important GMA goals. These departures from BAS may create a risk of impacts to riparian areas and wetlands, specifically. Based on the Critical Areas Handbook's guidance, it follows that riparian areas and wetlands are the highest-priority critical areas for monitoring due to these departures from BAS. During BAS review for the 2025 CAO update, literature review indicated that the science related to geologically hazardous and frequently flooded areas, critical aquifer recharge areas, and non-riparian FWHCAs had not changed significantly since the last code update. This indicates that the existing codes were still sufficiently protective and the County is not departing from BAS. Therefore, monitoring for these other critical areas is recommended to be deprioritized.

Feasibility

The County currently has staff expertise in riparian area and wetland monitoring. The County also has historic data layers for riparian areas and wetlands and, although they may not contain the quality or type of information needed for comprehensive analysis, they can offer some comparative insight. WLRD has also completed two intensive studies looking at how impacts to riparian areas impact stream temperature and other environmental variables. Leveraging the County's expertise and previous studies will make development of a long-term riparian and wetland monitoring program more feasible. While the County has gathered important data on other critical areas, such as critical aquifer recharge areas, landslide hazard maps, and channel migration maps, as well as developed the 2024 King County Flood Management Plan, the County has not developed comprehensive monitoring programs for critical aquifer recharge areas, non-riparian FWHCAs, frequently flooded areas, or geologically hazardous areas. This lack of resources and expertise creates feasibility challenges to develop a new monitoring program for these other critical areas.

Cost Effectiveness

There are several factors that contribute to a cost-effective program. Focusing on critical areas where the County departed from BAS (e.g., riparian areas and wetlands), ensures that the monitoring funding will focus on areas where critical areas may be at risk of impacts. Monitoring of these areas will lead to improvement in critical area protections, creating certain benefits. For example, benefits may include stronger critical area protections, improved education of permit applicants, streamlined permitting

¹⁴ 2024 King County Comprehensive Plan, <https://cdn.kingcounty.gov/-/media/king-county/depts/executive/performance-strategy-budget/regional-planning/2024-kccp-update/2024-adopted/2024-comprehensive-plan.pdf?rev=8c9147c220064060a86a47a02bf96243&hash=81804AF1C5C32245756C43DE92173FB0>

¹⁵ K.C.C. 21A.24.515, https://aqua.kingcounty.gov/council/clerk/code/24-30_Title_21A.htm#_Toc122352145

processes, and improved data collection leading to better mitigation monitoring. Focusing on critical areas where the County has not departed from BAS does not lead to a high likelihood of benefits to critical areas. Therefore, the investment in riparian area and wetland monitoring is more cost-effective due to the reduced risk and the creation of significant critical area protection benefits.

Examples of permits that are recommended to be prioritized in the monitoring program related to riparian areas and wetlands include:

- Clearing and grading permits
- Building permits
- Commercial/industrial permits

These are the permits expected to most impact these critical areas.

The feasibility of developing this new program, combined with the likely benefit of protecting these critical areas, suggest that wetlands and riparian areas are the subset the County should be monitoring in the short term. Below is a table describing the various critical areas and a recommendation as to whether to conduct monitoring now or later (Table 5).

Table 5. Descriptions of critical areas.

Critical Area	Details excerpted from Critical Areas Handbook	Recommendation
Wetlands	Wetlands are fragile ecosystems that serve a number of important beneficial functions. Wetlands assist in the reduction of erosion, siltation, flooding, and ground- and surface-water pollution, and provide wildlife, plant, and fisheries habitats. Wetlands destruction or impairment may result in increased public and private costs or property losses.	<i>Include</i>
Fish and Wildlife Habitat Conservation Areas	Fish and wildlife habitat conservation is the management of land for maintaining species in suitable habitats within their natural geographic distribution, so that isolated subpopulations are not created.	<i>Include riparian areas only</i>
Critical Aquifer Recharge Area	Much of Washington’s drinking water comes from groundwater supplies. The quality of groundwater in an aquifer is inextricably linked to its recharge area. Once groundwater is contaminated, it is difficult, costly, and sometimes impossible to clean up. Preventing contamination is necessary to avoid exorbitant costs, hardships, and potential physical harm to people.	<i>Do not include now</i>
Geologically Hazardous Areas	Geologically hazardous areas include areas susceptible to erosion, sliding, earthquakes, or other geological events. They pose a threat to the health and safety of citizens, fish, and wildlife, when incompatible commercial, residential, or industrial development is sited in areas of significant hazard.	<i>Do not include now</i>

Frequently Flooded areas	Floodplains and other areas subject to flooding perform important hydrologic functions and may present a risk to persons and property. Historic losses to salmon habitat have occurred as a result of development encroaching into floodplains. In addition to minimizing adverse effects to human health, safety, and infrastructure, floodplains are ideal locations for salmon habitat restoration.	<i>Do not include now, beyond existing flood risk monitoring and the flood hazard management plan</i>
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The recommended phased monitoring and adaptive management program addresses state requirements while also balancing short-term feasibility and resource impacts. It also initiates implementation of the related County policies and codes. As the program further develops in the second phase, the program will more fully align with policy and code requirements and be able to inform the next 10-year update to BAS, CAO, and the Comp Plan.

E. An analysis of how phasing implementation of the program, such as applying it to streams and wetlands first, and to other types of critical areas later, would impact the timeline, as well as any impacts to the environment that might result from phasing the work

Based on the Critical Areas Handbook guidance, the County’s departures from BAS, feasibility, and cost-effectiveness, a phased approach to monitoring critical areas is recommended (Table 6). This report recommends phasing implementation of critical areas, beginning with the highest-priority critical areas: riparian areas and wetlands. The recommendation focuses on these critical areas in the near term since these areas have the highest risk of environmental impacts and potential for benefits due to adaptive management.

After the 2034 BAS, CAO, and Comp Plan updates, the County may have better information to develop monitoring programs for other critical areas, depending on available resources and the scope of the update. This would allow sufficient time to conduct additional planning, mapping, and analysis needed as the basis for developing monitoring programs for these new areas. The Critical Areas Handbook states that, if local governments are incorporating BAS, then the environment will be protected. The recommendations prioritize critical areas monitoring where the County has departed from BAS, directing resources to areas where the risk of environmental impact is greatest. During BAS review for the 2024 CAO update, literature review indicated that the science had not changed significantly since the last code update, indicating the existing codes were still sufficiently protective. Therefore, monitoring for these other critical areas is recommended to be deprioritized or phased in later.

This phased approach is also beneficial since the County wouldn’t need as many resources up front and could spread the costs over a longer period. Delaying development of monitoring and adaptive management programs for other critical areas may create minimal impacts to the environment because our current regulatory protections are assumed to be protective. Delaying these other critical areas monitoring program will also benefit from any future state guidance provided. With landslide hazard and channel migration mapping already in place, development is currently restricted, reducing potential for future impacts. The main downside of the phased approach is the delay in securing monitoring

expertise in these areas and potentially delaying the County’s ability to adaptively manage these other critical areas protection programs.

Table 6. Phased approach to developing a monitoring and adaptive management program, by element and critical area.

Critical Areas	Program Elements			
	Permit implementation monitoring	Permit effectiveness monitoring	Ecological validation monitoring	Adaptive management actions
Wetlands	Phase 1	Phase 1	Phase 1	Phase 1
Fish and Wildlife Habitat Conservation Areas (<i>riparian areas only</i>)	Phase 1	Phase 1	Phase 1	Phase 1
Other FWHCA Areas	Phase 2	Phase 2	Phase 2	Phase 2
Critical Aquifer Recharge Areas	Phase 2	Phase 2	Phase 2	Phase 2
Frequently Flooded Areas	Phase 2	Phase 2	Phase 2	Phase 2
Geological Hazard Areas	Phase 2	Phase 2	Phase 2	Phase 2

Note: This report only describes resources need for Phase 1 actions. Additional funding and resources will be needed for Phase 2 actions. Phase 2 actions would potentially begin after the 2034 BAS, CAO, and Comp Plan update.

VI. Summary and Next Actions

The plan described above provides a Critical Areas Monitoring and Adaptive Management Program plan consistent with the Washington State Department of Commerce Critical Areas Handbook. The plan also advances King County Comprehensive Plan policies relating to monitoring and adaptive management and carries out the King County Code directive to evaluate the effect of the CAO on critical area functions and values. Features of the approach described in this plan include the following:

King County would make evidence-based recommendations every cycle, guiding continuous improvement in permitting and protection. At a high level, improvements would result from modifying the existing permit tracking system to be user-friendly and more informative and by tracking permitted projects longer. Ecological monitoring would focus on wetlands and riparian areas and track landcover change, setting the geographic extent to optimize available resources. Actionable recommendations from each type of monitoring would lead to action and continuous improvement.

The program would inform routine and required CAO and BAS updates. Establishing a monitoring and adaptive management program strengthens the County’s ability to make targeted updates to CAO and BAS. The program would establish an integrated foundation of county-specific evidence and provide

deeper insights into how code is translated into permits and implemented (or not) on the ground. In combination, these improvements would ensure updates are both necessary and effective.

Additional resources would be needed. The analysis presented here is at the conceptual to 30 percent design level, meaning that many details still need to be worked out. Existing programs will meet some of the need with adjustments, but developing an integrated approach that reliably collects, analyzes, and reports data from all three forms of monitoring, then allocates resources to fulfill the recommended actions, requires additional resources.

The program aligns with the Clean Water Health Habitat Strategic Plan. A program would demonstrate the principles of integration, systems change, and outcome-driven decision-making. It would support each of the six goals:

1. Healthy Forests and More Green Space: Ensuring forest cover and functions are protected.
2. Cleaner, Controlled Stormwater Runoff: Ensuring critical areas are healthy for aquatic life.
3. Better Fish Habitat: Ensuring native, wild fish populations are thriving.
4. Functional River Floodplains: Ensuring floodplains are connected and vegetated.
5. Reduced Toxics and Fecal Pathogens: Ensuring pollutants and contaminants are minimized.
6. Resilient Marine Shorelines: Ensuring marine shorelines have clean water and healthy beaches.

In summary, this report lays out evidence-based, cyclical recommendations (e.g., every five and 10 years) to continuously improve permitting and protection processes by upgrading the permit tracking system and extending and integrating monitoring efforts across departments. The program plan aims to effectively allocate resources and drive actionable improvements. It proposes a phased approach targeting wetlands and riparian areas that, while requiring additional resources and further design details, minimizes disruptions to existing work programs.

Total Development Costs: The estimated labor cost to develop the program is \$1.4 million over two years, with no monetary resource required unless the labor was performed by consultants instead of King County staff.

Total Implementation Costs: The estimated labor cost to implement one five-year cycle of monitoring and adaptive management is \$6.6 million, with an additional cost of \$3 million every ten years. Over a ten-year period, completing five-year tasks two times and 10-year cycle tasks once, the total cost of the program would be \$16.2 million, or approximately \$1.62 million per year, or \$3.24 million per biennium.