Attachment A
Motion 1698

2023 Rural Flooding Assessment Report

October 2023

King County

I. Contents

II. Proviso Text

Ordinance 19546, Section 80, Proviso P1[1]

P1 PROVIDED THAT:
Of this appropriation, $100,000 shall not be expended or encumbered until executive transmits a rural flooding assessment report and a motion that should acknowledge receipt of the report and a motion acknowledging receipt of the report is passed by the council. The motion should reference the subject matter, the proviso's ordinance number, ordinance section and proviso number in both the title and body of the motion.

The report shall include, but not be limited to, the following:
A. An assessment of county programs that address flooding in rural unincorporated King County including the Neighborhood Drainage Assistance Program, Agricultural Drainage Assistance Program, and Stormwater Capital Improvement Program.
B. To better address flooding, erosion and sedimentation impacts to homes, infrastructure, farms and salmon habitat on tributary streams and alluvial fans, and support equitable access to services, the report shall identify opportunities to update:

1. Program scope or scopes;
2. Types of services and projects supported by the county;
3. Related codes; and
4. Prioritization criteria for project selection.

C. The report shall be informed by a review of investments and outcomes of:

1. Current regulatory requirements
2. Lifecycle cost and benefit considerations;
3. Recommendations of the Alluvial Fan Report dated September 8, 2020;
4. The Griffin Creek Integrated Drainage Pilot Project
5. Recommendations of the Fish, Farm, and Flood Regulatory Task Force;
6. State authorizing legislation for Surface Water Management Fees; and
7. Funding options, including grant funding.

D. The findings and recommendations of the report should inform the update of King County's Flood Hazard Management Plan and future updates to King County Codes and programs that address rural flooding.

The executive should electronically file the report and motion required by this proviso no later than August 1, 2023, 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] Ordinance 19546

III. Executive Summary

Flooding presents recurrent challenges to the residents of rural King County. Flooding associated with major rivers that impact public infrastructure, such as roads, are the responsibility of several established King County agency work programs, such as those housed in the River and Floodplain Management Section (RFMS) of the Department of Natural Resources and Parks (DNRP), and the Road Services Section of the Department of Local Services (DLS).

King County's responsibility to respond to rural flooding—that is, the smaller-scale localized flooding on private property resulting primarily from improperly functioning drainage infrastructure, alluvial fans, or beaver dams—is not as clearly established. Flooding on private property may not fall under the scope of responsibility of a current King County program. Drainage infrastructure on private lands (known as "off right-of-way") is usually not maintained by King County per King County Code (KCC) 9.04.120, although landowners impacted by runoff from adjacent development may receive County assistance.[2] Localized flooding problems within the King County maintained right-of-way (ROW) are the responsibility of the Road Services Section of DLS. The Department of Natural Resources and Parks (DNRP) currently manages three programs tasked with specific actions that are related to reducing impacts of rural flooding: the Neighborhood Drainage Assistance Program (NDAP), the Agricultural Drainage Assistance Program (ADAP), and a Capital Improvement Program called the Natural Drainage Flooding (NDF) program.

Without County assistance, the ability of private landowners to take on flood-hazard reduction actions or respond to emergencies on their property is limited by federal, state, and county regulations protecting habitat, water quality, and public safety. There are stringent permitting requirements for working within critical areas (i.e., flood hazard areas, aquatic areas and buffers, geologic hazards) and these are the areas where most flood hazards exist. Generally, within these areas, flood hazard reduction or drainage projects must be pursued by a public agency or sponsored by the King County Flood Control District (FCD). Also, for the purposes of this report, the term "rural flooding" is distinct from the "seasonal flooding" of larger rivers, which is the focus of the FCD.

Ordinance 19546, Section 80, P1, calls for a report to the King County Council that assesses the County's rural flooding programs, identifies opportunities to update rural flooding programs and related codes, reviews investments and outcomes in related regulatory and policy areas, and provides findings and recommendations. Findings and recommendations include:

- The Agricultural Drainage Assistance and the Natural Drainage Flooding programs are operating consistent with the legislation that authorized them. No changes to the programs are recommended.
- Since 1993, when the NDAP was created, significant changes to the unincorporated area and the type and scope of drainage complaints received by the program have occurred. In addition, the limited program budget and state law constraints on the use of surface water management (SWM) fees indicate a need to update NDAP's scope and priority criteria for project selection.

[2] https://kingcounty.gov/council/legislation/kc_code/12_Title_9.aspx

- Because the current County programs do not meet the needs of private landowners experiencing flooding problems in the natural environment, the creation of an Integrated Drainage Program (IDP) is recommended.
- Currently, the County's rural flooding programs conduct limited public outreach and project identification is complaint driven. DNRP recommends increasing awareness of the programs, how they are accessed, and how they can benefit landowners and communities in historically underserved and non-English-speaking communities to rectify existing inequities in program resource distribution. This effort will include, but not be limited to, translating public-facing materials into languages other than English.
- Current King County Comprehensive Plan updates provide an opportunity for modifications to the King County Code (KCC). Code changes could allow for more efficient, focused flood responses and for the implementation of multi-objective projects that, in addition to providing flood hazard protection or solving drainage issues, can improve aquatic habitat conditions.
- The existing programs would benefit from a standard, objective set of criteria to guide project selection and prioritization. These criteria must reflect the requirements of the Revised Code of Washington (RCW) for the use of SWM fees, the multi-benefit priorities of the Clean Water Healthy Habitat initiative, further Equity and Social Justice (ESJ) objectives, and evaluate life cycle costs.

IV. Background

Department Overview: The King County Department of Natural Resources and Parks (DNRP) supports sustainable and livable communities and a clean and healthy natural environment. Its mission is to foster environmental stewardship and strengthen communities by providing regional parks, protecting the region's water, air, land, and natural habitats, and reducing, safely disposing of, and creating resources from wastewater and solid waste.

Division Overview: The Water and Land Resources Division (WLRD) has a biennial budget of roughly $485 million. WLRD provides stormwater management services for unincorporated areas, supports three watershed-based salmon recovery forums, acquires open space, restores habitat-forming processes on streams and major river systems, monitors water quality, controls noxious weeds, and provides economic and technical support for forestry and agriculture. As the primary service provider to the King County Flood Control District (FCD), WLRD reduces flood hazards to people, property, and infrastructure; inspects and maintains more than 500 river facilities; and partners in floodplain restoration. Additionally, WLRD operates the County's Environmental Lab and Science sections, which provide environmental monitoring, data analysis, and management and modeling services to partners, jurisdictions, and residents throughout the region. The King County Hazardous Waste Management Program–a collaborative effort with King County and its municipalities–is also part of WLRD.

The Stormwater Services (SWS) Section of WLRD is responsible for implementing stormwater management programs within unincorporated King County that are consistent with and address portions of the requirement of King County Code (KCC) 9.08.040 to employ a "comprehensive approach to surface and stormwater problems, which would reduce flooding, erosion, and sedimentation…".

Key Historical Conditions: In the last three decades, King County has developed three programs to address rural flooding in unincorporated King County. Cities manage similar flooding within their own boundaries.

- In 1993, the Neighborhood Drainage Assistance Program (NDAP) was created to address localized flooding, erosion, and sedimentation problems situated within the off-road drainage system in the unincorporated area of King County, which included approximately 513,000 people as compared to 250,000 people currently.[3]
- The Agricultural Drainage Assistance Program (ADAP) was initiated through an interlocal agreement (ILA) between the Washington State Department of Fish and Wildlife (WDFW) and King County in late 2011.
- The Stormwater Capital Improvement Program, also known as the Natural Drainage Flooding (NDF) Program, was established in 2017 and consolidated three capital improvement efforts to address chronic drainage and flooding problems associated with streams, lakes, and wetlands.

Key Current Conditions: Rural flooding in unincorporated King County has been found by DNRP data to most frequently be caused by:

- **Improperly functioning drainage infrastructure.** Drainage infrastructure on private lands is not maintained by King County, except when such work provides a stormwater system benefit. Over time, with more comprehensive surface water management requirements and improved stormwater systems, the frequency of these problems has decreased, based on DNRP field staff experience. Current challenges with rural private drainage infrastructure tend to be related to erosion downslope of drainage structure outfalls and associated with access-road crossings, based on DNRP field staff experience.
- **Stream channel movement on alluvial fans.** Alluvial fans are an accumulation of sediments that fan outwards where steep streams enter a flat valley floor. These can cause localized flooding that threatens structures and infrastructure constructed on or adjacent to the fans. Alluvial fans are found in river valleys across King County. Past land use regulations did not effectively restrict development on fans and, as a result, occupied structures are frequently located on active fans. Approaches to managing flood hazards from alluvial fans include public acquisition of properties located on or near alluvial fans, or removal of deposited sediments that can cause flooding, either through dredging or installation of an instream sediment facility.[4]
- **Beaver dams.** Beaver populations are increasing in rural King County.[5] Beaver dams back up water, which can lead to flooding problems. At the same time, beaver dams store and slowly release water, support wetland and stream habitat functions, filter sediment and pollutants, and keep water cooler. Landowners who experience flooding due to beaver dams can obtain assistance from special-purpose districts, non-governmental organizations such as Beavers Northwest, and from the WDFW.

[3] 1990 population: zUKC_profile_2018update.xlsx (kingcounty.gov). Current population: 29-EIR-Current-Conditions-2024-KCCP-PRD-060123.ashx (kingcounty.gov)

[4] Instream sediment facilities are over-excavated areas that a stream flows through and the velocity of water slows down causing sediment to settle to the bottom before the water flows out the lower end of the facility.

[5] King County. 2022. Planning for beavers manual: anticipating beavers when designing restoration projects. Prepared by Jen Vanderhoof, King County Water and Land Resources Division. Seattle, Washington.

When these drainage issues occur on private property, state law constrains King County's use of surface water management (SWM) fees to respond (see State Authorizing Legislation for Surface Water Management Fees in section C below). King County collects SWM fees from unincorporated King County residents as regulatory charges, and, under Washington state law, the nature of these fees restricts their available uses.[6]

As described above, DNRP administers three programs to address surface water problems in rural areas within unincorporated King County. Both NDAP and ADAP projects are initiated in response to a constituent contacting the County, either online or by phone, through the SWS drainage assistance program. Between 2019 and 2022, a total of 643 complaints related to drainage, water quality, or stormwater facilities were received by the SWS drainage assistance program. Out of those 643 complaints, 360 requests were related to drainage, 148 request were related to stormwater facilities, and 135 requests were related to water quality. Table 1 shows drainage and water quality complaints reported by Community Service Area across unincorporated King County from 2019 to 2022.[7]

Table 1. Stormwater complaints by category for each Community Service Area

Community Service Area	Stormwater complaint type			
	Drainage	Water Quality	Stormwater Facility	Total
Bear Creek/Sammamish	79	84	26	189
Snoqualmie Valley/Northeast King County	81	15	32	128
Four Creeks/Tiger Mountain	56	19	13	88
Greater Maple Valley/Cedar River	42	12	22	76
Southeast King County	88	15	28	131
West King County	1	3	1	5
Vashon/Maury Island	13	0	13	26
Total	360	148	135	643

Following receipt of a complaint, a SWS stormwater engineer will perform an on-site inspection, evaluate the situation, and discuss possible solutions with the property owner, which may involve referral to the NDAP, ADAP, or NDF programs (see Appendix B for a visual overview of the drainage assistance workflow). If the problem is in the County road right-of-way, the issue will be referred to the Road Services Division of the Department of Local Services (DLS). Where funding is unavailable and the project does not meet either NDAP, ADAP, or the NDF program's priority criteria, SWS can provide a landowner with a list of professional services that the landowner can hire. Stormwater engineers may also provide technical assistance, including directing landowners to the relevant permitting pathways for solutions and explaining the relevant portions of King County's Surface Water Design Manual.[8]

Report Methodology: DNRP subject matter experts developed the contents in this report. The King County Prosecuting Attorney's Office also reviewed and contributed content. Program managers of the

[6] RCW 36.89.080
[7] https://kingcounty.gov/en/legacy/depts/local-services/programs/community-service-areas.aspx
[8] https://kingcounty.gov/en/dept/dnrp/nature-recreation/environment-ecology-conservation/stormwater-surface-water-management/surface-water-design-manual/surface-water-design-manual-2021

three rural flooding programs shared information to inform the analysis, findings, and recommendations.

The statutory and/or legal elements foundational to the analysis, findings, and recommendations in this proviso include:

- KCC Title 9 Surface Water, Stormwater and Groundwater Management[9]
- KCC Title 21A Zoning, Chapter 21A.24 Critical Areas[10]
- KCC Title 16 Building and Construction Standards, Chapter 16.82 Clearing and Grading[11]
- Revised Code of Washington (RCW) 36.89.080 Stormwater Control Facilities Rates and Charges-Limitations-Use[12]

Findings from the Alluvial Fan Report dated September 8, 2020; the Griffin Creek Integrated Drainage Pilot Project; and the Fish Farm, Farm, Flood Regulatory Task Force informed and are aligned with the recommendations of this proviso. [13,14,15]

V. Report Requirements

A. Assessment of County Programs

Several DNRP programs can help mitigate the impacts of rural flooding within unincorporated King County, including:

- Neighborhood Drainage Assistance Program (NDAP),
- Agricultural Drainage Assistance Program (ADAP), and
- Natural Drainage Flooding (NDF), a Capital Improvement Program (CIP).

Each of these rural flooding programs addresses a specific set of drainage issues identified at the time of its creation and each has a distinct scope of service with limitations on the type of projects that can be undertaken. Over time, the service needs of the rural, unincorporated King County areas have evolved while the program requirements have not changed, resulting in gaps in service (Table 2).[16]

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[9] https://aqua.kingcounty.gov/council/clerk/code/12_Title_9.pdf
[10] https://kingcounty.gov/en/legacy/council/legislation/kc_code/24_30_title_21a
[11] https://aqua.kingcounty.gov/council/clerk/code/19_Title_16.htm
[12] https://apps.leg.wa.gov/rcw/default.aspx?cite=36.89.080
[13] https://mkcclegisearch.kingcounty.gov/LegislationDetail.aspx?ID=4635061&GUID=447FAB66-4118-4A6A-B510-52522C819BF1&Options=Advanced&Search=
[14] https://kingcountygreen.com/2023/04/03/first -griffin-creek-flooded-now-farms-and-fish-can-return-following-completion-of-innovative-king-county-project/
[15] https://kingcounty.gov/~/media/services/environment/watersheds/snoqualmie-skykomish/snoqualmie-fish-farm-flood/Regulatory_Task_Force/RTF-Assumptions-and-Outcomes-10119.ashx?la=en
[16] King County's Rural Area refers collectively to the geography that contains very low-density residential development, commercial and industrial development, farms, forests, watersheds crucial for both fisheries and flood hazard management, mining areas and towns, historic sites and buildings, archaeological sites, and regionally important recreation areas. https://cdn.kingcounty.gov/-/media/depts/executive/performance-strategy-budget/regional-planning/2016CompPlanUpdate/2022UpdateTo2016-asAmended/2016_KCCP_KingCountyComprehensive_Plan-updated_12062022_with_Ord_19555

Table 2. Rural flooding program services based on environmental conditions and land ownership.

	Ownership	
	Public	**Private**
Natural Environment	NDF	ADAP for agricultural lands No current program for other lands
Built Environment[17]	Stormwater Services Section Asset Management Unit Capital Services Unit	NDAP

When drainage issues occur on private property, King County's response is constrained by state law and funding limitations. Washington state law limits the type of work that can be funded with SWM fees, and grant funding may not be available. Because of the large number of eligible projects and a limited budget, DNRP prioritizes NDAP projects using an assessment that provides a benefit/cost ratio (Figure 3, Appendix B). The ADAP and NDF programs have separate project selection criteria, discussed later in this report.

Neighborhood Drainage Assistance Program (NDAP)

NDAP was created to address localized flooding, erosion and sedimentation problems situated within the off-road drainage system. The program assists landowners impacted by runoff resulting from the cumulative effects of development where flows exceeding the capacity of the stormwater system or where system maintenance is lacking. Although the impact of an individual drainage or flooding problem may be relatively minor, the large number of County residents affected by neighborhood drainage problems led to the program's creation.

Projects undertaken by NDAP range from removing a blockage in a pipe or installing sandbags; to replacing old infrastructure with new pipes and culverts or excavating ditches; to increasing the capacity of privately-owned stormwater facilities; to maintenance efforts, such as removing sediment on alluvial fans. The NDAP projects take place on private properties in the built environment. In some cases, state law constraints on allowable uses of SWM fees limit the County's options to assist on these projects (see State Authorizing Legislation for Surface Water Management Fees in section C below).

The NDAP selects projects using a scoring system populated with information collected during a drainage investigation (see Figure 1, Appendix B). The resulting impact score quantifies the relative severity and extent of the drainage problem's effects on privately owned structures, septic systems, wells, and natural resources. The impact score is then divided by the estimated cost to remedy the problem. The projects with the best cost/benefit ratio are given the highest priority. However, this scoring system is not the sole driver of project selection. Over the last decade, NDAP has become more frequently used for emergency projects where there is an imminent threat to public health, safety, and welfare, or to persons or property.

Since NDAP's inception, King County's urban and rural unincorporated service areas and the nature of drainage complaints have changed substantially. Annexation and incorporation of urban unincorporated

[17] https://www.epa.gov/smm/basic-information-about-built-environment#builtenviron

areas by cities have both reduced the number of drainage complaints on smaller urban lots and the revenue base for the County's SWM fee. At the same time, technological improvements and more stringent development regulations and stormwater management requirements have resulted in increasingly effective stormwater management practices that reduce flooding and erosion impacts of new development. When NDAP was formed in the early 1990's, the program focused on upgrading stormwater retention facilities associated with land development that were not large enough to decrease runoff rates to meet pre-development conditions. Since then, the reductions in urban service area and improvements in stormwater management have reduced the frequency of the specific problems related to development that NDAP was originally created to address. Although drainage problems from legacy infrastructure still persist, many of the remaining drainage problems are either more complex, i.e., associated with natural systems, or are beyond the scale that is practical to be completed by an individual landowner.

The current annual NDAP budget is roughly $60,000 and is fully funded by the County's SWM fee. Historically, the program has completed between one to nine projects annually (Table 3). Given the size of the budget, only one to three NDAP projects receives funding each year.

Table 3. Types of NDAP projects undertaken annually from 2018 to 2022

Year	New Facility[A]	Quick Fix[B]	Retrofit or Maintenance[C]	Annual total
2018	1	6	2	9
2019	2	1	1	4
2020	0	6	2	8
2021	1	1	2	4
2022	0	1	2	3

[A] Constructing new infrastructure to resolve a drainage problem. The property owner will own and maintain the facility.

[B] The task/project will take less than one crew-day to complete.

[C] Restoring or improving the function of existing private drainage facility.

Because of evolving drainage needs, the limited budget, and requirements of state law, there is need to update the scope and criteria for NDAP. This need is further discussed in Section B.

Agricultural Drainage Assistance Program (ADAP)

The ADAP provides technical assistance for the maintenance of waterways that are used to remove excess water from farm fields to allow for cultivation of agricultural lands in unincorporated King County. Although most ADAP projects are conducted on private lands to improve private drainage infrastructure, the ADAP may take on projects that improve conditions on public property.

The current program, known as "streamlined ADAP," was initiated through an interlocal agreement (ILA) between the Washington State Department of Fish and Wildlife (WDFW) and King County in late 2011. Under the ILA, King County facilitates a Hydraulic Project Approval (HPA) review for certain activities related to maintaining existing agricultural drainage.[18] Projects are permitted by obtaining a HPA from

[18] https://wdfw.wa.gov/licenses/environmental/hpa

the WDFW. The ILA describes the scope of ADAP and identifies best management practices (BMPs) for ADAP projects. These are further described in the Manual of BMPs for Maintenance of Agricultural Waterways in King County.[19] King County Code provides ADAP with programmatic allowances and ADAP activities are exempt from the Federal Clean Water Act (33 U.S.C.) permitting requirements through agricultural exemptions.[20] As currently operated, ADAP works with special-purpose districts to improve conditions for farming within the County's Agricultural Production Districts.[21] To qualify for assistance from this program, landowners must implement water quality best management practices as part of a Farm Management Plan prepared by the King Conservation District.[22] These projects protect farmland, and the associated water quality improvement is viewed as providing a system benefit.

Examples of ADAP project actions include removing accumulated sediments from drainage ditches, known as agricultural waterways; replacing nonfunctioning culverts with bridges; performing water-crossing maintenance and replacement; performing drain tile technical assistance; or removing beaver dams that impede the flow of water off farm fields. These projects are for private properties on agricultural lands. The ADAP drainage projects are limited to agricultural waterways below the Shoreline of the State discharge threshold, i.e., a mean annual flow of less than 20 cubic feet per second (cfs).[23] Additional qualification criteria constrain the scale of projects taken on by ADAP. Project prioritization is based on the increase in usable area of farmland through drainage improvements.

Since 2015, ADAP has partnered with the King Conservation District (KCD), which has secured grants from the Flood Control District to augment the $550,000 annual County budget for the program. This partnership has enabled the program to take on between six and 13 projects a year, depending on the size and complexity of the projects (Table 4), and to exceed its goal of completing drainage work on roughly 10,000 linear feet of agricultural waterways each year.

Table 4. Annual ADAP project totals and outcomes

Year	Number of Projects	Linear Feet Maintained	Acres Farmland Improved
2017	6	14,511	328
2018	6	18,775	178
2019	6	15,029	132
2020	6	11,269	337
2021	13	20,248	186
2022	10	14,537	317

[19] https://your.kingcounty.gov/dnrp/library/water-and-land/agriculture/drainage-assistance-program/adap-bmp-manual-201204.pdf
[20] https://www.epa.gov/laws-regulations/summary-clean-water-act
[21] https://kingcounty.gov/en/dept/dnrp/nature-recreation/environment-ecology-conservation/stormwater-surface-water-management/drainage-problems-assistance/agricultural-drainage-assistance/agricultural-drainage-assistance-program
[22] King County Code 21A.24.051 Agricultural activities development standards https://aqua.kingcounty.gov/council/clerk/code/24-30_Title_21A.htm#_Toc122352145
[23] https://app.leg.wa.gov/WAC/default.aspx?cite=173-18-210&pdf=true

The current ADAP is a functional and effective service delivered to agricultural operations in King County and is operating consistent with the legislation that authorized it. As a result, no changes to the program are needed.

Natural Drainage Flooding (NDF) Program

The NDF program was established in 2017 and consolidated three capital improvement efforts to address chronic drainage and flooding problems associated with streams, lakes, and wetlands. Natural drainage patterns change continuously through variations in rainfall and groundwater levels, as well as the effects of ongoing erosion, sedimentation, vegetation growth, and beaver activities. These changes in the amount and routing of surface water during storm events can lead to flooding of roads, farmland, residences, businesses, and public facilities.

The NDF projects that address chronic drainage and flooding problems may include constructing new stormwater facilities, removing sediment, controlling vegetation, and other work to improve drainage or otherwise reduce flooding outside of the built environment. Other potential actions include the purchase of flood-prone property, replacement, or installation of culverts, or altering stream channels to increase the effective routing of sediment and stormwater in flood-prone areas.

NDF projects are typically initiated based on drainage complaints that have been assessed with feasibility studies or were identified because of the urgency and severity of the problem. Projects are prioritized based on problem severity, urgency, environmental impact, cost/benefit, opportunity, readiness, community interest, and Equity and Social Justice (ESJ) criteria.

Although the NDF program does not focus on fish passage or environmental restoration, some of its projects have included these types of actions when it is appropriate to use a multi-benefit project design. The NDF program is funded by a capital project budget and thus is dedicated to County-owned assets and is not suited for emergency projects. Projects may not address problems sited solely on private property unless the projects create or improve a County asset (e.g., a drainage facility that is maintained by the County).

The 2023-2024 biennial NDF program budget is $1,245,000. Since its inception in 2017, the NDF program has undertaken the following projects: Horseshoe Lake flood reduction; Mud Creek restoration, acquisition, and sediment facility construction; Tributary 291A sediment facility; Country Creek and Cabbage Creek sediment facilities; Riverpoint flood reduction; and Allen Lake/Sammamish stormwater retrofit.[24] Overall, the program is meeting the purpose identified when it was created.

The current NDF program is a functional and effective service for rural flooding problems in the natural environment on public lands in unincorporated King County. As a result, no changes to the program are needed.

[24] https://kingcountyfloodcontrol.org/wp-content/uploads/2022/09/Attach-H-FCD-2023-Capital-Project-List-AC-recommendation-8-31-22.pdf

B. Opportunities to Update

As called for by the Ordinance, to better address flooding, erosion and sedimentation impacts to homes, infrastructure, farms, and salmon habitat on tributary streams and alluvial fans, and support equitable access to services, the report shall identify opportunities to update: (1) existing program scopes; (2) the types of services and projects supported by the County; (3) related codes; and (4) the prioritization criteria for project selection.

Over the spring of 2023, DNRP reviewed founding documents, performance data, current program workloads, barriers to implementation, and planned projects for the three programs related to rural flooding. The information collected informed the recommendations of this response.

1. Existing Program Scopes

Neighborhood Drainage Assistance Program (NDAP)

Because of the changes to the type and scope of drainage complaints that are considered for NDAP assistance since the program was created in 1993, budget limitations, and state law constraints on the use of SWM fees for improvements to the stormwater system, as described in the above, DNRP recommends an update to NDAP's scope and priority criteria for project selection. The program focus of NDAP should be narrowed to a specific set of drainage issues that are likely to remain challenging in the future (as discussed in the Assessment of County Programs section).

Currently, the best-fit projects include those in the off-right-of-way (ROW) system where a retrofit or similar project would broadly address offsite stormwater impacts and the landowner is not otherwise legally required to take action. This could include retrofits of off-ROW legacy infrastructure affecting rural flooding. NDAP could serve a larger number of customers by shifting the program focus away from designing and implementing projects on behalf of private landowners and toward providing them with technical assistance to identify the source of the drainage issue and outlining potential options and permitting pathways to address the issue.

At this time there is no existing program that responds to rural flooding emergencies. Effective emergency response requires operational flexibility and a rapid response time. Among existing programs, DNRP views NDAP as the program that is currently configured to best respond to rural flooding emergencies, However, emergency services are not currently budgeted for NDAP. In contrast, capital programs cannot be applied to emergency situations due to the requirements for initiating a project as there is an extended period of feasibility analysis required before initiating an action.[25] A dedicated budget could be considered to fund emergency rural flooding responses.

Agricultural Drainage Assistance Program (ADAP)

No changes are recommended to the current scope of ADAP. The program is operating consistent with the original intention, addressing flooding, erosion and sedimentation impacts to farms in compliance with the 2011 ILA. The ADAP processes are supported by KCC, and substantial changes may require

[25] https://kc1.sharepoint.com/sites/DNRP/wlrd/regional/PM

amendments to the code, as well as a review of the Shorelines Exemption and re-accomplishing the programmatic State Environmental Policy Act (SEPA) Determination of Nonsignificant (DNS).[26,27]

Natural Drainage Flooding (NDF) Program

As discussed above, the NDF program currently provides the service envisioned when it was created. No changes to scope are recommended at this time because the program is functioning effectively to achieve its intended goals. In addition, there are limited opportunities for increasing the scope of services with current SWM fee revenues and budget, as the program is funded through the SWS capital project budget which is focused on constructing or improving permanent King County capital assets sited on King County-owned lands or within County easements on privately-owned lands. Finally, the NDF program cannot be expanded to rapidly respond to flooding issues as emergency actions are not compatible with the capital project management process.

2. Types of Services and Projects Supported by the County

New Integrated Drainage Program (IDP)

Although portions of the rural flooding problem are addressed by existing programs, such as those that occur on public lands or in the built environment, there is no program that deals with flooding issues on private lands in the natural environment, outside the limited scope of ADAP on agricultural areas.

Recurrent flooding has increased on properties adjacent to tributary streams, on alluvial fans in agricultural areas, and on other sites with a low-density land use.[28] This is largely due to regulatory changes in the wake of Endangered Species Act (ESA) listings of salmon in the late 1990s and stronger state and county protections for streams, wetlands, and shorelines.[29] These changes have limited the ability to conduct in-channel work to remove accumulated sediment, which provides habitat benefit but can also increase flood risk.

In 2023, DNRP completed a successful pilot project on Griffin Creek in the Snoqualmie Valley that demonstrated how flood hazard mitigation, agricultural drainage improvements, and fish passage enhancement can be combined in a single project. Based on this experience and the need for multi-benefit projects on privately held natural lands, DNRP recommends creating a program designed to mitigate rural flooding impacts on select private lands where projects will improve the stormwater system and also provide habitat benefits. The proposed Integrated Drainage Program (IDP) must be designed and implemented in a manner consistent with applicable federal and state regulations and tribal resource objectives and could require policy and code changes.

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[26] A Shoreline Exemption allows uses expected to have minimal effect without requiring a permit https://www.oria.wa.gov/site/alias__oria/mid__12357/403/handbook-entry?ItemID=130

[27] https://apps.leg.wa.gov/rcw/default.aspx?cite=90.58.030 https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-FAQ

[28] https://kingcounty.gov/en/dept/dnrp/nature-recreation/environment-ecology-conservation/flood-services/flooding-in-king-county-watersheds/snoqualmie-south-fork-skykomish-watershed

[29] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Guidance-for-floodplains-Critical-Areas-Ordinanc

Funding for the future ongoing program has not been identified and thus, these projects would have to compete with other SWM funded capital projects and programs for funding. IDP projects would require multiple funding partners, including private and public entities, because projects cannot be solely funded by SWM fees. It would also require collaboration among multiple partners toward shared goals because of the multiple interests engaged in natural resource management in the rural areas. In the case of Griffin Creek, DNRP partnered with the King Conservation District, the Snoqualmie Watershed Improvement District, and local landowners. The project entailed consultation with the Snoqualmie and Tulalip tribes because of the aquatic resource value of the project site, as Griffin Creek is an important salmon stream.

The recommended IDP would:

- Assess, mitigate, or avoid impacts on alluvial fans. This requires a technical assessment, including mapping the location of alluvial fans in the rural unincorporated area and possible acquisition of alluvial-fan hazard areas.
- Establish criteria that must be met for projects to be considered for the IDP program, such as landowner cost share, level of ecological improvement, flood risk reduction, expected public benefit, and cost effectiveness.
- Identify code changes that may be necessary to support integrated drainage projects, particularly those that require work in stream channels, some of which may be addressed in the update to the critical areas ordinance as part of the Comprehensive Plan update process.
- Help acquire funding not currently in place for IDP projects not entirely fundable using SWM fees.
- Provide technical assistance to SWM ratepayers and service districts (e.g., the Snoqualmie Watershed Improvement District and King Conservation District) to perform flood hazard reduction actions. This technical assistance would be provided through engineering support to identify solutions and aid with obtaining funding and permits.
- Implement IDP projects that address rural flooding and achieve multiple objectives.

Equity and Social Justice (ESJ)

Currently, the rural flooding programs conduct limited public outreach. Project identification is complaint-driven, which increases the likelihood of inequitable access to the programs and services as not all ratepayers have equal access to the online resources and awareness of the programs.[30] Individuals and groups who are aware of these services and have access to WLRD staff or elected County officials are more likely to request and receive assistance.

DNRP recommends increasing access to and awareness of the programs through greater community outreach to historically underserved communities about how they can benefit from the programs. This effort would include translating the rural flooding program's public-facing materials and web pages into languages other than English.[31]

[30] https://kingcounty.gov/en/dept/dnrp/nature-recreation/environment-ecology-conservation/stormwater-surface-water-management/drainage-problems-assistance/drainage-assistance/drainage-assistance
[31] https://kingcounty.gov/en/dept/dnrp/nature-recreation/environment-ecology-conservation/stormwater-surface-water-management/drainage-problems-assistance

3. Related Codes (Regulatory Revisions)

King County Code 16.82 and 21A.24 prescribe the allowed actions, and shape the possible responses to, addressing rural flooding.[32,33] DNRP recommends the following potential regulatory revisions to address alluvial fans, emergency responses to flooding, and flooding caused by beaver dams. Effective and statutorily compliant code language could be developed collaboratively between DNRP and DLS-Permitting.

First, the primary challenge to providing effective relief to flooding on alluvial fans and tributary streams is the limited ability to complete instream work unless it is part of an aquatic habitat enhancement project. This is because actions specifically focused on removing accumulated sediments or reconstructing flood protection facilities are generally not permitted under the current local regulations and policies. To do so would generate changes to KCC 21A.24.045 Critical Areas Allowed Alterations.[30]

Removing sediment from streams is only allowed as part of a project sponsored by the FCD under KCC. Work in tributary streams or on alluvial fans is not usually sponsored by the FCD and, thus, is not allowed under the Critical Areas Code. Similarly, the Alluvial Fan Report prepared in 2020 by DNRP identified that instream sediment facilities are not currently an allowed Critical Areas Alteration under KCC.[34]

Second, King County does not have a general responsibility to provide an emergency response to rural flooding on private property.[35] However, in many cases, it is not possible for a landowner to obtain a permit for flood reduction actions. King County could explore clarifying permitting pathways, for landowners to conduct emergency sediment removal where life, safety, critical infrastructure, and fish passage are imminently threatened.

KCC does not contain specific language on actions related to beaver dam management. Clearing and grading permits for managing beaver dams are extended on a case-by-case basis, determined by the presumed impacts to adjacent critical areas, e.g., wetlands and aquatic areas. In many cases, this results in an expensive and time-consuming permit process that is not aligned with the necessary rapid response to prevent or reduce flooding. Beaver dams and activities are regulated by the WDFW through the issuance of an HPA, which can be obtained quickly at no cost. The County is exploring opportunities to align the regulations to decrease the permitting burden on landowners while maintaining environmental protections.

4. Prioritization Criteria for Project Selection

DNRP recognizes the benefit of developing a common, objective, and consistent set of prioritization criteria for all rural flooding projects. This would help ensure compliance with overarching regulations, limit King County liability, support County initiatives such as Clean Water Healthy Habitat, and provide

[32] https://kingcounty.gov/council/legislation/kc_code/19_Title_16.aspx
[33] https://kingcounty.gov/council/legislation/kc_code/24_30_Title_21A.aspx
[34] King County - File #: 2020-RPT0126
[35] https://s3-us-west-2.amazonaws.com/asfpm-library/Legal/ASFPM_Comparative_look_at_pub_liability_for_flood_haz_mitigation_09.pdf

for cost-effective multi-benefit projects. These criteria are the basis for decision making and each program may add criteria based on the nature and goals of the program.

Where drainage issues occur on private property, King County's response is constrained by state law, as demonstrated in Section C, and limited funds are available for the work. Thus, a primary criterion for project eligibility is ensuring consistency with state law and a demonstrated benefit to the County's stormwater system in responding to stormwater runoff impacts.

Following confirmation of project eligibility, additional prioritization criteria should then be applied. Examples of prioritization criteria include:

- Severity of the flooding problem being addressed (e.g., whether living space is being inundated or whether emergency vehicle access is being denied)/frequency of the flooding problem.
- Level of habitat and ecological benefit.
- Advancement of equity and social justice.
- Whether the project achieves multiple objectives.
- Number of landowners benefitting from the action/acres improved or protected by the project.
- Level of community support for projects and level of support from tribal governments.
- Cost effectiveness.

C. Investments and Outcomes

Addressing rural flooding is not a straightforward endeavor due to a complex overlay of federal, state, and local land use regulations that shape the allowed actions within critical areas (such as aquatic areas, buffers, and wetlands), where much of the local flooding occurs. This section provides DNRP's review of how various regulations, past projects, studies and reports, and funding sources shape the County's rural flooding programs.

1. Current Regulatory Requirements

Flood-prone areas and actions to mitigate impacts of rural flooding in those areas are regulated by federal, state, and local governments. At the federal level, Federal Emergency Management Agency (FEMA) regulations related to the National Flood Insurance Program (NFIP), Section 404 of the Clean Water Act, Section 10 of the River and Harbors Act, and the Endangered Species Act all apply.[36,37,38] At the state level, the Hydraulic Code and the Shorelines Management Act regulate activities that would potentially address rural flooding.[39,40] At the local level, the King County Clearing and Grading (KCC

[36] https://www.epa.gov/cwa-404/permit-program-under-cwa-section-404#:~:text=Overview,the%20United%20States%2C%20including%20wetlands
[37] https://www.spl.usace.army.mil/Missions/Regulatory/Jurisdictional-Determination/Section-10-of-the-Rivers-Harbors-Act/
[38] https://www.epa.gov/laws-regulations/summary-endangered-species-act
[39] https://app.leg.wa.gov/wac/default.aspx?cite=220-660
[40] https://ecology.wa.gov/Water-Shorelines/Shoreline-coastal-management/Shoreline-coastal-planning/Shoreline-Management-Act-SMA

16.82) and Zoning (KCC 21A.24) codes are the main areas of regulation for the response to rural flooding.[41,42]

2. Lifecycle Benefits and Costs

The cost of implementing rural flooding projects varies by the scale and complexity of the rural flooding problem, the type of assistance provided, the project design, and whether a project is a capital improvement with a long-term benefit. Including an assessment of the life cycle costs and benefits in initial project scoping is an effective mechanism to guide an evaluation of all available options.

Addressing rural flooding often requires a long-term commitment that extends beyond an initial project implementation, especially in areas in which natural forces result in high levels of sedimentation. This is because ongoing maintenance is required to sustain the effectiveness of any management action. Understanding the full life cycle costs of a project to inform decision making requires looking at the upfront project costs and ongoing maintenance, both of which can vary widely. For example, the costs of sediment removal and site stabilization vary between programs, ranging between $70/cubic yard for ADAP projects and up to roughly double that amount for capital projects, not including acquisitions or permitting costs. Depending on the site conditions, sediment removal maintenance intervals can range from seven years in areas with erosive soils to up to 28 years in more stable systems.[43] As a result, projects with high upfront costs may be more cost effective over time if they result in lower maintenance costs. Property acquisition is an example of a project that has large one-time expenditures, but potentially significant reduction in the need for maintenance and the interval at which maintenance must be applied. In addition, acquiring frequently flooded properties moves people from harm's way.

3. Recommendations of the Alluvial Fan Report Dated September 8, 2020

Alluvial fan areas are subject to flash flooding, erosion, sediment deposition, and channel migration.[44] The formation of alluvial fans is a natural process that brings risks of flooding, erosion, and sedimentation to roads, culverts, agriculture, and homes located in these hazard areas.

The 2020 Alluvial Fan Report to the Council stated: "…the County should take a comprehensive risk-management approach for management of alluvial fans. This includes preventing new at-risk development and infrastructure and creating new tools and pathways to reduce risks and damages to existing infrastructure and property while protecting aquatic resources." Several of the recommendations in the Alluvial Fan Report fit with the recommended set of revisions in this report. These recommended revisions include exploring a permit pathway for alluvial fan management contingent upon certain conditions, such as providing longer-term habitat benefit, or considering adding alluvial fans as another natural hazard risk criteria when reviewing candidate parcels for acquisition for risk reduction and habitat protection.

4. The Griffin Creek Integrated Drainage Program Pilot

The project was initiated in response to a request from a farmer for assistance with mitigating flooding that prevented the planting of about 100 acres of farm fields. The project, completed in fall 2022,

[41] https://kingcounty.gov/council/legislation/kc_code/19_Title_16.aspx
[42] https://kingcounty.gov/council/legislation/kc_code/24_30_Title_21A.aspx
[43] King County - File #: 2019-RPT0167
[44] https://www.skagitriverhistory.com/flood_glossary.htm

alleviated flood hazards, improved agricultural drainage, and removed barriers to the upstream migration of adult salmon. Of the project's total cost of $840,000, King County was responsible for $296,000; the balance was paid for by the landowners and community partners.

Griffin Creek is an example of how multi-objective projects can meet the needs of many affected parties. In addition, the project was able to be permitted under existing KCC, as there was a significant habitat restoration component in the project design. The project is a model for the IDP using partnership with conservation and service districts and landowners to balance project costs among project collaborators. King County did not take on ownership or maintenance obligations for the site.

5. Recommendations of the Fish, Farm, and Flood (FFF) Regulatory Taskforce

The FFF Regulatory Task Force spent several years reviewing the issues identified in the 2017 FFF agreement and forwarded recommendations to the King County Executive in late 2020.[45]These recommendations included allocating King County staff time to work on the FFF recommendations and "develop an Integrated Drainage Program that takes a holistic approach to address agricultural drainage in concert with salmon recovery and flood safety objectives."[46] Recommendations presented in this report align with and further the implementation of the FFF Regulatory Task Force findings.

6. State Authorizing Legislation for Surface Water Management Fees

In addition to its general police powers authorizing King County to take actions to promote public health, safety, and welfare, King County is authorized under RCW 36.89.080 to fix rates and charges for "the furnishing of service to those served or receiving benefits or to be served or receive benefits from any stormwater control facility" or those who contribute "to an increase of surface water runoff." [47] Stormwater control facilities are defined by state law as "any facility, improvement, development, property or interest therein, made, constructed or acquired for the purpose of controlling, or protecting life or property from, any storm, waste, flood, or surplus waters wherever located within the county, and shall include but not be limited to the improvements and authority described in RCW 86.12.020 and chapters 86.13 and 86.15 RCW."[48]

7. Funding Options, Including Grant Funding

Given limited SWM funding, rural flooding projects often rely on grant funding, including those shown in Table 5.

[45] https://your.kingcounty.gov/dnrp/library/water-and-land/watersheds/snoqualmie-skykomish/fish-farms-flooding/king-county-fish-farm-flood-final-agreement-pkg-june-2017.pdf
[46] https://kingcounty.gov/~/media/services/environment/watersheds/snoqualmie-skykomish/snoqualmie-fish-farm-flood/Letters_TO_Exec_Constantine/IOC_Letter_to_Executive_-_RTF_Recommendations,-d-,docx.ashx?la=en
[47] https://apps.leg.wa.gov/rcw/default.aspx?cite=36.89.080
[48] https://app.leg.wa.gov/rcw/default.aspx?cite=36.89.010

Table 5. Grant funding sources for flooding projects available to King County and community partners[55]

Grant Program	Funding Source	Amount	Examples of Work Funded
Flood Reduction Grants[49]	King County Flood Control District	$12M annually	Stormwater retrofits, localized drainage problems
WaterWorks Grants[50]	King County Wastewater Division	$5M available for 2023/24	Water quality improvement projects
Brian Abbott Fish Barrier Removal Board[51]	WA Recreation & Conservation Office	$25M awarded in 2023	Fish passage
Floodplains by Design[52]	WA Ecology	Depends on legislature	Improve flood protection for communities in floodplains,
Water Quality Combined Funding Program[53]	WA Ecology	Several million dollars	Water quality improvements
Flood control assistance account program (FCAAP)[54]	WA Ecology	$1.5 million for 2021-23 biennium	Developing Flood Hazard Management Plans

D. Findings and Recommendations

This section identifies the multiple factors contributing to gaps in King County services related to mitigating impacts from rural flooding, the associated funding challenges, and limitations due to existing law. Based on these findings, a set of recommendations for changes to improve King County's response to rural flooding are offered in Table 6.

[49] https://kingcountyfloodcontrol.org/grant-programs-funding/flood-reduction-grants-open/
[50] https://kingcounty.gov/services/environment/grants-and-awards/waterworks.aspx
[51] https://rco.wa.gov/grant/brian-abbott-fish-barrier-removal-board/
[52] https://ecology.wa.gov/About-us/Payments-contracts-grants/Grants-loans/Find-a-grant-or-loan/Floodplains-by-design-grants
[53] https://ecology.wa.gov/About-us/Payments-contracts-grants/Grants-loans/Find-a-grant-or-loan/Water-Quality-Combined-Funding-Program
[54] https://ecology.wa.gov/About-us/Payments-contracts-grants/Grants-loans/Find-a-grant-or-loan/Flood-control-assistance
[55] e.g., Special Purpose Districts: Snoqualmie Watershed Improvement District, King Conservation District, local tribes, municipalities, landowners, and nonprofit organizations.

Table 6. Summary of recommendations to better address rural flooding

Scope of Existing Services
• Neighborhood Drainage Assistance Program: Given the changes to the unincorporated area and the changes in the type and scope of drainage complaints received by the program since it was initiated in 1993, and state law constraints, DNRP recommends refining the NDAP's criteria to focus on projects that maximize benefit to the County's stormwater system. • Agricultural Drainage Assistance Program: The program is operating effectively and consistent with its initiating legislation and no changes are recommended. Natural Drainage Flooding Program: The program is operating effectively and consistent with its initiating legislation and no changes.
Modification of the Types of Services
• The current rural flooding programs do not address the needs of private owners of natural lands that experience regular flooding. Therefore, DNPR recommends developing an Integrated Drainage Program (IDP) to mitigate rural flooding impacts on select private lands while providing habitat benefits. The proposed IDP must be designed and implemented in a manner consistent with applicable federal and state regulations and Tribal resource objects and will require identifying funding partners. • The complaint basis for the programs results in equitable distribution of the services and their benefit. DNRP recommends translating public-facing materials and increasing community outreach to improve access to and awareness of the County's rural flooding programs in underserved and non-English-speaking communities.
Regulatory Revisions
Permitting regulations can be a barrier for project implementation. In collaboration with DLS Permitting DNRP will explore: • Developing a permitting pathway under KCC 21A.24 and KCC 16.82 for multiple objective projects to address flood hazards, drainage, and aquatic habitat restoration in aquatic areas and their buffers, and on geologic hazards, such as alluvial fans. • Clarifying permitting pathways for landowners to conduct emergency sediment removal where life, safety, critical infrastructure, and fish passage are imminently threatened.
Prioritization Criteria
Establishing a consistent set of base criteria for all rural draining programs would help to improve decision making. After determining eligibility for SWM funds, the programs should use criteria the following criteria to guide project selection: • Severity of the flooding problem being addressed (e.g., whether living space is being inundated or whether emergency vehicle access is being denied)/frequency of the flooding problem. • Level of habitat and ecological benefit. • Advancement of equity and social justice. • Whether the project achieves multiple objectives. • Number of landowners benefitting from the action/acres improved or protected by the project. • Level of community support for projects and level of support from tribal governments. • Cost effectiveness.

VI. Appendices

Appendix A: King County Codes Related to Rural Flooding
Appendix B: Drainage Assistance Workflow
Appendix C: Glossary

Appendix A. King County Codes Related to Rural Flooding

King County Code 21A.24.045 – Allowed Alterations. Only allowed alterations (i.e., the proposed actions) can be performed in critical areas in unincorporated King County. The allowed alterations table below identifies the specific sediment removal actions allowed in critical areas. Yellow highlighting identifies the situations where it is permittable to remove accumulated sediment from an Aquatic Area outside the public right-of-way. The numbers referenced in the yellow highlighting refer to the pertinent conditions for the allowance, included below the table.

A=alteration is allowed Numbers indicate applicable development condition in subsection D. of this section	Landslide Hazard Over40% and Buffer	Steep Slope Hazard and Buffer	Wetland and Buffer	Aquatic Area and Buffer and Severe Channel Migration	Wildlife Habitat Conservation Area and Wildlife Habitat Network
Grading		A13		A14	A4, 14
Construction of a bridge or culvert as part of a driveway or private access road	A39	A39	A39	A39	A39
Maintenance, repair or replacement of existing surface water conveyance system	A33	A33	A16, 32, 38	A16, 40, 41	A4, 37
Construction of new surface water flow control facility	A32			A32	A4, 32
Maintenance or repair of existing surface waterflow control facility	A16	A16	A16	A16	A4
Construction of new flood protection facility	A42			A42	A27, 42
Maintenance, repair or replacement of flood protection facility	A33, 43	A33, 43	A43	A43	A27, 43
Flood risk reduction gravel removal	A61	A61	A61	A61	A61
Construction of new instream structure or instream work	A16	A16	A16	A16, 44, 45	A4, 16, 44, 45
Habitat restoration or enhancement project	A49	A49	A49	A49	A4, 49
Construction of agricultural drainage	A57			A57	A4, 57
Maintenance or replacement of agricultural drainage	A23, 58	A23, 58	A23, 53, 54, 58	A23, 53, 54, 58	A4, 23, 53, 54, 58
Maintenance of agricultural waterway			A69	A69	

14. The following are allowed in the severe channel migration hazard area if conducted more than one hundred sixty-five feet from the ordinary high-water mark in the rural area and natural resource lands and one-hundred fifteen feet from the ordinary high-water mark in the urban area:

a. grading of up to fifty cubic yards on lot less than five acres; and

b. clearing of up to one-thousand square feet or up to a cumulative thirty-five percent of the severe channel migration hazard area.

16. Allowed when performed by, at the direction of or authorized by a government agency in accordance with regional road maintenance guidelines

23. Allowed as follows:

a. if conducted in accordance with an approved forest management plan, farm management plan or rural stewardship plan; or

b. without an approved forest management plan, farm management plan or rural stewardship plan, only if:

(1) removal is undertaken with hand labor, including hand-held mechanical tools, unless the King County noxious weed control board otherwise prescribes the use of riding mowers, light mechanical cultivating equipment or herbicides or biological control methods;

(2) the area is stabilized to avoid regrowth or regeneration of noxious weeds;

(3) the cleared area is revegetated with native vegetation and stabilized against erosion; and

(4) herbicide use is in accordance with federal and state law;

32. Allowed in an existing roadway if conducted consistent with the regional road maintenance guidelines.

33. Allowed outside the roadway if:

a. the alterations will not subject the critical area to an increased risk of landslide or erosion;

b. vegetation removal is the minimum necessary to locate the utility or construct the corridor; and

c. significant risk of personal injury is eliminated or minimized in the landslide hazard area.

38. Allowed if:

a. conveying the surface water into the wetland or aquatic area buffer and discharging into the wetland or aquatic area buffer or at the wetland or aquatic area edge has less adverse impact upon the wetland or aquatic area or wetland or aquatic area buffer than if the surface water were discharged at the buffer's edge and allowed to naturally drain through the buffer;

b. the volume of discharge is minimized through application of low impact development and water quality measures identified in the King County Surface Water Design Manual;

c. the conveyance and outfall are installed with hand equipment where feasible;

d. the outfall shall include bioengineering techniques where feasible; and

e. the outfall is designed to minimize adverse impacts to critical areas.

40. Allowed for an open, vegetated stormwater management conveyance system and outfall structure that simulates natural conditions if:

a. fish habitat features necessary for feeding, cover and reproduction are included when appropriate;

b. vegetation is maintained and added adjacent to all open channels and ponds, if necessary to prevent erosion, filter out sediments or shade the water; and

c. bioengineering techniques are used to the maximum extent practical.

41. Allowed for a closed, tightlined conveyance system and outfall structure if:

a. necessary to avoid erosion of slopes; and

b. bioengineering techniques are used to the maximum extent practical.

42. Allowed in a severe channel migration hazard area or an aquatic area buffer to prevent bank erosion only:

a. if consistent with the Integrated Streambank Protection Guidelines (Washington State Aquatic Habitat Guidelines Program, 2002) and if bioengineering techniques are used to the maximum extent practical, unless the applicant demonstrates that other methods provide equivalent structural stabilization and environmental function;

b. based on a critical areas report, the department determines that the new flood protection facility will not cause significant impacts to upstream or downstream properties; and

c. to prevent bank erosion for the protection of:

(1) public roadways;

(2) sole access routes in existence before February 16, 1995;

(3) new primary dwelling units, accessory dwelling units or accessory living quarters and residential accessory structures located outside the severe channel migration hazard area if:

(a) the site is adjacent to or abutted by properties on both sides containing buildings or sole access routes protected by legal bank stabilization in existence before February 16, 1995. The buildings, sole access routes or bank stabilization must be located no more than six hundred feet apart as measured parallel to the migrating channel; and

(b) the new primary dwelling units, accessory dwelling units, accessory living quarters or residential accessory structures are located no closer to the aquatic area than existing primary dwelling units, accessory dwelling units, accessory living quarters or residential accessory structures on abutting or adjacent properties; or

(4) existing primary dwelling units, accessory dwelling units, accessory living quarters or residential accessory structures if:

(a) the structure was in existence before the adoption date of a King County Channel Migration Zone hazard map that applies to that channel, if such a map exists;

(b) the structure is in imminent danger, as determined by a geologist, engineering geologist or geotechnical engineer;

(c) the applicant has demonstrated that the existing structure is at risk, and the structure and supporting infrastructure cannot be relocated on the lot further from the source of channel migration; and

(d) nonstructural measures are not feasible.

43. Applies to lawfully established existing structures if:

a. the height of the facility is not increased, unless the facility is being replaced in a new alignment that is landward of the previous alignment and enhances aquatic area habitat and process;

b. the linear length of the facility is not increased, unless the facility is being replaced in a new alignment that is landward of the previous alignment and enhances aquatic area habitat and process;

c. the footprint of the facility is not expanded waterward;

d. consistent with the Integrated Streambank Protection Guidelines (Washington State Aquatic Habitat Guidelines Program, 2002) and bioengineering techniques are used to the maximum extent practical;

e. the site is restored with appropriate native vegetation and erosion protection materials; and

f. based on a critical areas report, the department determines that the maintenance, repair, replacement or construction will not cause significant impacts to upstream or downstream properties.

44. Allowed in type N and O aquatic areas if done in least impacting way at least impacting time of year, in conformance with applicable best management practices, and all affected instream and buffer features are restored.

45. Allowed in a type S or F water when such work is:

a. included as part of a project to evaluate, restore or improve habitat, and

b. sponsored or cosponsored by a public agency that has natural resource management as a function or by a federally recognized tribe.

49. Limited to alterations to restore habitat forming processes or directly restore habitat function and value, including access for construction, as follows:

a. projects sponsored or cosponsored by a public agency that has natural resource management as a primary function or by a federally recognized tribe;

b. restoration and enhancement plans prepared by a qualified biologist; or

c. conducted in accordance with an approved forest management plan, farm management plan or rural stewardship plan.

53. Limited to activities in continuous existence since January 1, 2005, with no expansion within the critical area or critical area buffer. "Continuous existence" includes cyclical operations and managed periods of soil restoration, enhancement or other fallow states associated with these horticultural and agricultural activities.

54. Allowed for expansion of existing or new agricultural activities where:

a. the site is predominantly involved in the practice of agriculture;

b. there is no expansion into an area that:

(1) has been cleared under a class I, II, III, IV-S or no conversion IV-G forest practice permit; or

(2) is more than ten thousand square feet with tree cover at a uniform density more than ninety trees per acre and with the predominant mainstream diameter of the trees at least four inches diameter at breast height, not including areas that are actively managed as agricultural crops for pulpwood, Christmas trees or ornamental nursery stock;

c. the activities are in compliance with an approved farm management plan in accordance with K.C.C. 21A.24.051; and

d. all best management practices associated with the activities specified in the farm management plan are installed and maintained.

58. If the agricultural drainage is used by salmonids, maintenance shall be in compliance with an approved farm management plan in accordance with K.C.C. 21A.24.051.

61. Allowed if sponsored or cosponsored by the countywide flood control zone district and the department determines that the project and its location:

a. is the best flood risk reduction alternative practicable;

b. is part of a comprehensive, long-term flood management strategy;

c. is consistent with the King County Flood Hazard Management Plan policies;

d. will have the least adverse impact on the ecological functions of the critical area or its buffer, including habitat for fish and wildlife that are identified for protection in the King County Comprehensive Plan; and

e. has been subject to public notice in accordance with K.C.C. 20.44.060.

69. Only for maintenance of agricultural waterways if:

a. the purpose of the maintenance project is to improve agricultural production on a site predominately engaged in the practice of agriculture;

b. the maintenance project is conducted in compliance with a hydraulic project approval issued by the Washington state Department of Fish and Wildlife pursuant to chapter 77.55 RCW;

c. the maintenance project complies with the King County agricultural drainage assistance program as agreed to by the Washington state Department of Fish and Wildlife, the department of local services, permitting division, and the department of natural resources and parks, and as reviewed by the Washington state Department of Ecology;

d. the person performing the maintenance and the landowner have attended training provided by King County on the King County agricultural drainage assistance program and the best management practices required under that program; and

e. the maintenance project complies with K.C.C. chapter 16.82.

Appendix B. Drainage Assistance Workflow

Figure 1. Drainage Assistance workflow (NDAP). Green background indicates the programs and evaluations specific to private ownership.

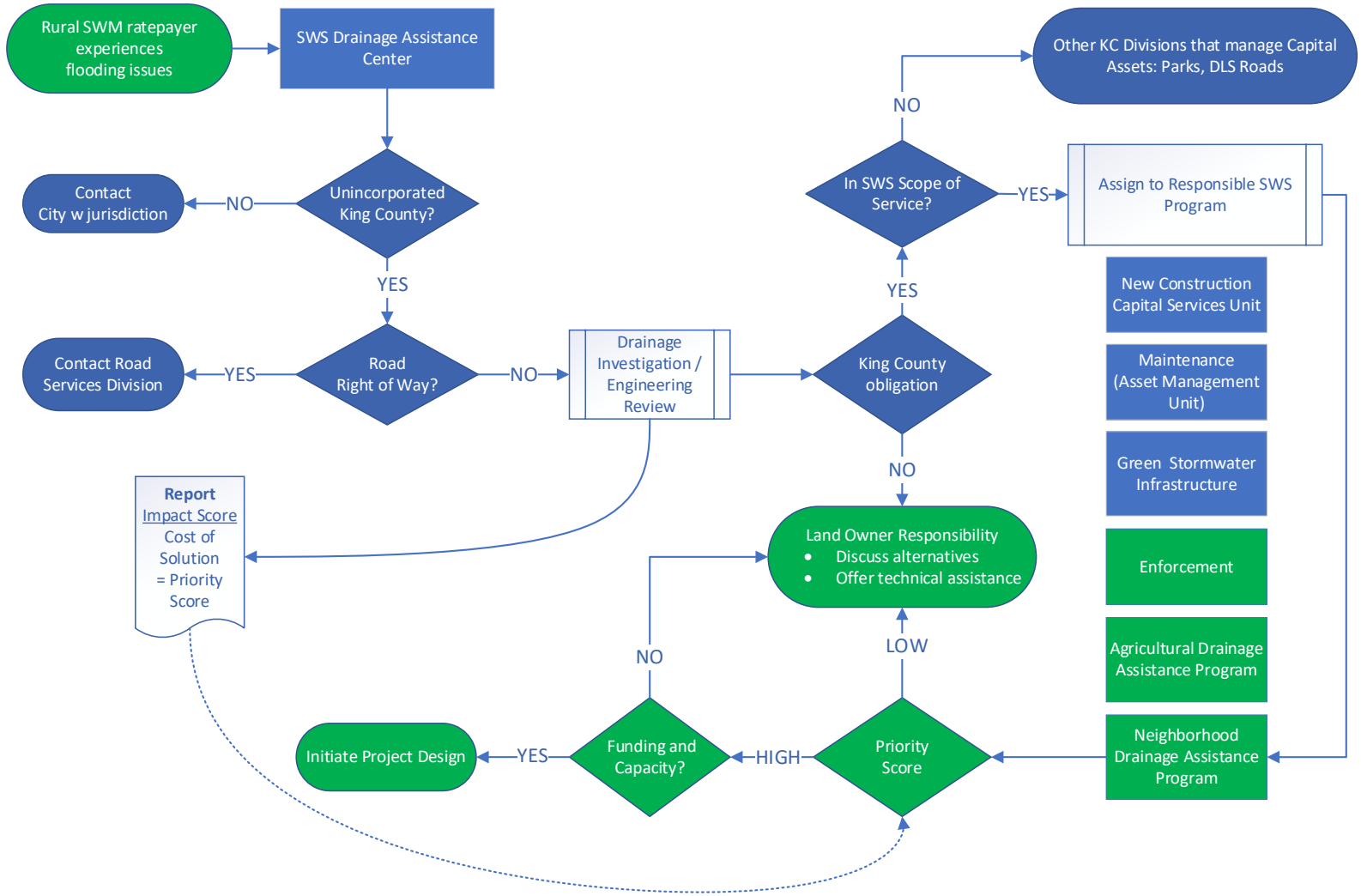

Figure 3. NDAP Priority Scoresheet

Neighborhood Drainage Assistance Program
Priority Scoresheet

Is project located in a targeted basin?	
Yes ☐	No ☐

Project Name: _____
Project Number: _____

********** IMPACT CRITERIA **********					
Impact	Points	Severity Add 0, 2 or 4	# Properties Impacted	Future Risk Add 0, 2 or 4	Totals
Living structure finished floor *	20				0
Access	4				0
Septic, well	8				0
Other structure, crawlspace	4				0
Landscaping, yard, parking	1				0
Other property, drainage system	0.5				0
Natural resources	3				0
				Subtotal:	0
********** EVENT FREQUENCY FACTOR **********					
Chronic (1+ times/year)	20				
2-5 years, indefinite but often, channel erosion	10				
5-10 years	5			Event Frequency Factor:	
10-25 years	2				
>25 years	1			Total Impact Score:	0
Date: _____			Rated by: _____		
********** COST BENEFIT RATIO **********					
				Cost of Solution =	
Total Impact Score * 100 / Cost = NDAP Priority Score =					#DIV/0!
Date: _____			Rated by: _____		

* Flooding of living space by storms <10 year return receive top priority.

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G:\STORM\Share\SWSPOOL\NDAP Priority Scoresheet.docx

Appendix C. Glossary

Alluvial Fans: A fan-shaped wedge of sediment that typically accumulates on land where a stream emerges from a steep canyon onto a flat area. In map view it has the shape of an open fan.

Basin: The area of land that a river drains. This is used to determine how much water will enter a river after rainfall.

Benefit-to-Cost (b/c) Ratio: Represents the overall efficiency of a plan. Determined by dividing the value of the annual benefit by the annual cost.

Berm: A horizontal ledge cut into or at the top or bottom of an earth bank or cutting, to ensure the safety of a long slope.

Built Environment: Refers to the human-made surroundings that provide the setting for human activity, ranging in scale from buildings and parks or green space to neighborhoods and cities that can often include their supporting infrastructure, such as water supply or energy networks.

Buyout: The elimination of potential flood damages to houses or other types of structures by acquiring them and removing them.

CFS/C.F.S.: The measuring unit of cubic feet per second (C.F.S.), which is used to quantify the amount of flow in a wash. A cubic foot is equivalent to 7.5 gallons of water. Thus, 1 C.F.S. is 7.5 gallons of water passing by you every second.

Channel: An open conveyance of surface storm water having a bottom and sides in a linear configuration. Channels can be natural or man-made. Channels have levees or dikes along their sides to build up their depth.

Channel Modification: A man-made change to a channel's characteristics, typically for the purposes of reducing flood damages by increasing its overall conveyance. This can be accomplished by widening and/or deepening the channel, reducing the friction by removing woody vegetation.

Conveyance: The ability of a channel or other drainage element to move stormwater.

Development: A man-made change to property, such as buildings or other structures, mining, dredging, filling, grading, paving, excavation, or drilling operations. Fences or fence-type walls located within the floodplain are also included within this definition.

Discharge: The amount of water that passes a specific point on a watercourse over a given period of time. Rates of discharge are usually measured in cubic feet per second (C.F.S.).

Drainage Basin: That portion of the surface of the earth which is drained by a river and its tributaries, or which is occupied by a permanent body of water (lake, pond, reservoir) and all of its tributaries. Alternatively, a geographical area which contributes surface water runoff to a particular point. The terms “drainage basin,” “tributary area,” and “watershed” can be used interchangeably.

Dredging/Dredge: The scooping, or suction of underwater material from a harbor, or waterway. Dredging is one form of channel modification.

Flood: A flood is commonly interpreted as the temporary overflow of lands not normally covered by water, but which are used or usable by man when not inundated.

Flood Control: Various activities and regulations that help reduce or prevent damages caused by flooding. Typical flood control activities include structural flood control works (such as bank stabilization, levees, and drainage channels), acquisition of flood prone land, flood insurance programs and studies, river and basin management plans, public education programs, and flood warning and emergency preparedness activities.

Hydraulic Project Approval (HPA): A permit issued by the WDFW for construction or other work activities conducted in or near state waters that will "use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh waters of the state.

Instream sediment facility: Over-excavated areas that a stream flows through where the velocity of water slows down and causes sediment to settle to the bottom before the water flows out the lower end of the facility.

Off Road System: Any natural or constructed conveyance systems outside of King County maintained right of way. ·

Neighborhood Drainage Problem: A storm water conveyance problem located on private property and within SWM's service, which is caused by runoff primarily from other private property and is currently outside King County's or other public agency's scope of responsibility.

Outlet Structure: A hydraulic structure placed at the outlet of a channel, spillway, pipe, etc., for the purpose of dissipating energy and providing a transition to the channel or pipe downstream.

Outfall: An outfall is simply the pipe, channel, or opening where water "falls out" and then into another body of water, typically a drainage channel. In a typical stormwater detention basin, the outfall is at or connected to the lowest point of the basin so that detained water drains completely.

Runoff: Surface water resulting from rainfall or snowmelt that flows overland to streams, usually measured in acre-feet (the amount of water which would cover an acre one foot deep). Volume of runoff is frequently given in terms of inches of depth over the drainage area. One inch of runoff from one square mile equals 53.33 acre-feet.

Shoreline Exemptions: An exemption from the shoreline substantial development permit process to allow developments and uses within shoreline jurisdiction that are expected to have minimal effect on the natural environment without requiring a permit.

Shoulder Season Flooding: Flooding that occurs in early fall (October) and late spring (April), periods outside the usual November to February flood season.

Storm Drainage System: A drainage system for collecting runoff of storm water on highways and removing it to appropriate outlets. The system includes inlets, catch basins, storm sewers, drains, reservoirs, pump stations, and detention basins.

Storm Water/Stormwater: Precipitation from rain or snow that accumulates in a natural or man-made watercourse or conveyance system.

surface and stormwater management system: as defined in KCC 9.08 means constructed drainage facilities and any natural surface water drainage features that do any combination of collection, storing, controlling, treating or conveying surface and storm water.
Surface water conveyance: a drainage facility designed to collect, contain and provide for the flow of surface water from the highest point on a development site to receiving water or another discharge point, connecting any required flow control and water quality treatment facilities along the way. "Surface water conveyance "includes but is not limited to, gutters, ditches, pipes, biofiltration swales and channels.

Waters of the U.S.: All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce.

Watershed: An area from which water drains into a lake, stream, or other body of water. A watershed is also often referred to as a basin, with the basin boundary defined by a high ridge or divide, and with a lake or river located at a lower point.