Mason County

Update of County's Stormwater Policies/Regulations and Development of Comprehensive Stormwater Management Plans

Belfair Urban Growth Area Stormwater Management Plan: Addendum

Submitted to:
Mason County
Department of Public Works
411 N. Fifth Street
Shelton, WA 98584

Submitted by:
Otak, Inc.
10230 NE Points Drive
Suite 400
Kirkland, WA 98033
Otak Project No. 30784

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Transmittal

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Prepared By
Otak, Inc.
Joe Simmler, Ph.D.
Project Manager

Larry Grimm, PE
Project Engineer

Preface

This Addendum to the Belfair Urban Growth Area Stormwater Management Plan (SWM Plan) (Revised edition, July, 2007) has been prepared by Mason County in order to address the additional comments received from the public, regulatory agencies and major stakeholders (Tribes and businesses) since the June 20, 2007 Public Hearing. The original deadline of August 6, 2007 for presentation and submittal to the Western Washington Growth Management Hearings Board has been extended for sixty days to October 6, 2007. During this time, the County has elected to produce this Addendum, presenting further revisions and enhancements to the second draft of the Allyn SWM Plan.

The Belfair SWM Plan was funded by the Washington State Legislature through a budget proviso: Washington State Legislature 2005-2007 Capital Budget, Section 325(3). It is being jointly administered by the Washington State Department of Ecology and the Puget Sound Partnership.

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Section 1—Introduction

1.1 Objective and Intent

This Addendum to the Belfair Stormwater Management Plan (SWM Plan) was created by Mason County in order to respond to additional public comments received over the last several weeks. It includes and addresses the comments received verbally at the June 20, 2007 public meeting and the comments received via letters and in coordination meetings with regulatory agencies since July 2, 2007 when the revised SWM Plan was issued to the public. The receipt and analysis of the various public comments has resulted in an enhanced set of programmatic SWM activities and revised capital improvement program, as documented in this Addendum. Both the completeness and comprehensiveness of the proposed Allyn SWM Plan have been expanded and enhanced. These comments have also been used to structure and guide the development of the Countywide Comprehensive SWM Plan, conceptually presented in Section 3.0.

1.2 Format and Content

Public and regulatory comments collected from the June 20, 2007 public meeting and subsequent letters over the following weeks were reviewed, organized by topic and developed into recommended SWM Program enhancements. Each topic resulted in the collection of new information for water quality and shellfish, the expansion of an existing SWM activity or the addition of a new SWM activity or approach to the overall SWM Program. As an example, a decentralized approach has now been adopted to address the drainage related impacts of new development replacing the earlier approach using large regional centralized detention, treatment and/or conveyance systems. Also, a new SWM Program initiative has been added to retrofit all existing development using low impact development techniques, such as the bio-retention swale, in order to treat stormwater runoff prior to discharge. Similar SWM Program enhancements have been made for public involvement, design criteria, development standards, maintenance, public education, public involvement, water quality monitoring, inter- and intra-agency coordination and funding.

This Addendum and the July 2007 version of the final SWM Plan constitutes the final version of the SWM Plan proposed for the Belfair Urban Growth Area (UGA).

1.3 Overview of Public Process and BOCC Review

This Addendum will go through a second public review process beginning August 27, 2007 that consists of a public meeting on September 10, 2007, presentation to the Planning Commission on September 17, 2007, and presentation to the Board of County Commissioners (BOCC) at public hearings on September 18, 2007 (and possibly October 2, 2007) prior to a final decision by the BOCC.

Section 2—Receipt of Public Comments

2.1 Public Review Process

For Original Draft of the Belfair SWM Plan: Issued June 2007

The schedule for development and adoption of the Allyn UGA SWM Plan, and its associated public review process, has been driven by an August 6, 2006, Growth Management Hearings Board Final Decision and Order, which mandated the County's submittal of improved and adopted SWM Plan by August 6, 2007. In accordance with this target date, the draft Belfair UGA SWM Plan was developed and made available to the public in early June, 2007. The County hosted a public meeting to receive comments on the plan at the Port of Allyn on the evening of June 20, 2007, with the official comment period closing on June 29, 2007.

For Revised Draft: Issued July 2007

The plan was revised and re-issued on July 2, 2007, based on comments received at the public meeting and based on written comments from the Department of Ecology (Ecology) and the Puget Sound Action Team (PSAT) (now known as the Puget Sound Partnership (PSP)).

A briefing and two public hearings were held on the revised plan. The first public hearing was conducted before the County's Planning Advisory Committee (PAC) on July 9, 2007. A briefing was held before the Board of County Commissioners (BOCC) on July 23, 2007, and the second public hearing was conducted before the BOCC on July 24, 2007.

For Final Addendum: Issued September 2007

In early August, the Growth Management Hearings Board granted the County a 60-day extension of its original submittal deadline to October 6, 2007. This extension has provided the County the opportunity to continue to respond to comments and create this Addendum to finalize the SWM Plan. Completion of the Addendum precedes a second formal public review cycle that includes a public meeting scheduled on September 10, 2007, a PAC hearing on September 17, 2007, and a first hearing on adoption by the BOCC, scheduled for September 18, 2007. Should the first BOCC hearing be continued, a final hearing on adoption may be scheduled for October 2, 2007.

2.2 Comments Received

The County received comments on the draft plan and revised plan through public meetings, letters, and meetings with regulatory agencies. The following is a list of various sources of public comment that have been compiled and addressed in the Master Comment Response Matrix. *(Note that the Master Comment Response Matrix is a separate document and is available upon request from the County.)*

1. Department of Ecology Comment Letter Re: Allyn UGA SWM Plan, 6/29/07, Kim McKee, Unit Supervisor, Southwest Region Water Quality Program
2. Puget Sound Partnership Comment Letter Re: Allyn & Belfair UGA SWM Plans, 6/29/07, Brad Ack, Director
3. Department of Ecology Comment Letter Re: Belfair UGA SWM Plan, 7/2/07, Kim McKee, Unit Supervisor, Southwest Region Water Quality Program
4. Squaxin Island Tribe Letter Re: Allyn UGA SWM Plan, 7/24/07, John Konovsky, Environmental Program Manager
5. Lower Hood Canal Watershed Coalition Letter Re: Stormwater impacts to Hood Canal, 5/26/07, Robert Hager, Co-Chair
6. Lower Hood Canal Watershed Coalition Letter Re: County SW Policy and Regulations, 6/20/07, Robert Hager, Co-Chair
7. Lower Hood Canal Watershed Coalition Letter Re: Belfair UGA SWM Plan, 6/20/07, Robert Hager, Co-Chair
8. PAC Meeting Notes 7-9-07, Barb Robinson, Mason County, Department of Community Development, Director
9. Allyn Community Association Re: Allyn UGA SWM Plan Technical Issues, 6/29/07, Jeff Carey, President

The various comments have been grouped by topic, as presented in Table 2-1, and have been used to shape the content and format of this Addendum to the revised plan. Additional comments taken from Section 10 of the revised plan also have been included in Table 2-1 and are numbered accordingly.

Table 2-1—Grouping of Comments by SWM Topic

Stormwater Management Topic	# of Comments	Public Priority
Regulatory /Compliance/Programmatic Approval		
PSWQMP: 2.2.4, 2.16, 2.29	3	18
Basin Planning/Watershed Approval: 2.2.4, 2.18, 2.23, 2.2.2, 2.13, 3.4	6	16
Ranking of Problems: 2.2.4, 2.12, 2.18, 2.23, 2.37, 7.3	6	15
WQ Monitoring: 2.1.1, 2.1.2, 2.17, 7.12, 8.3, 8.14, 10.7, 10.32	8	12
Funding: 2.1.1, 2.1.2, 2.5, 2.15, 2.17, 2.22, 2.25, 3.17, 7.5, 10.2, 10.21, 10.34	12	4
Phase II NPDES: 1.1, 1.9, 2.29, 3.17, 10.29	5	17
Agency Coordination: 1.5, 2.22, 3.17, 5.3, 7.7, 8.13	6	14
Inspection/Inventory/Maintenance: 1.4, 1.6, 1.10, 2.18, 2.23,	11	6

2.37, 3.8, 3.18, 3.19, 5.1, 8.14		
Illicit Discharge Detection and Elimination (IDDE): 1.8, 1.10, 2.2.4, 2.23, 2.37, 3.16, 3.18	7	12
Public Education: 1.10, 2.1.2, 2.22, 2.37, 3.17, 3.18, 5.2, 7.9	8	11
Public Involvement: 1.10, 2.2.9, 3.18, 3.19, 7.6, 8.14, 9.5, 10.3, 10.9, 10.10	10	7
Programmatic: 2.2.4, 3.19	2	20
Countywide SWMP: 1.7, 2.22, 3.2	3	19
Natural Resource Protection/Enhancement		
Water Quality: 3.6, 3.10, 3.14, 4.1, 4.2, 5.1, 5.2, 6.1, 7.11, 8.7, 10.31, 2.1.1, 2.2.1, 2.2.3, 2.16, (2.31), 2.35, 2.36, 2.38, 3.1, 3.3	21	2
Shellfish: 2.2.3, 2.28, 2.35, 2.38, 4.1, 6.2, 8.2, 8.7	8	10
Salmon/Habitat: 2.2.3, 2.22, 2.38, 3.14, 4.4, 8.11, 8.13, 10.7, 10.41	9	9
Retrofit Existing/Bioretention/Decentralized CIP: 1.2, 1.4, 1.6, 2.12, 2.17, 2.22, 2.40, 3.1, 3.17, 4.1, 7.10, 8.13, 10.30, 3.14, 7.11, 8.6, 8.8, 8.9, 8.10, 9.1, 9.2, 9.4, 9.5, 10.28, 10.33	25	1
Development		
2005 Manual/Design Standards: 1.10, 2.1, 2.17, 2.22, 3.17, 3.18, 5.4, 6.1, 6.2, 6.3, 7.2	11	5
Low Impact Development (LID): 1.3, 2.1, 2.7, 2.10, 2.11, 2.14, 2.19, 2.20, 2.21, 2.22, 2.40, 3.7, 3.17, 7.8, 7.9, 10.12	16	3
Dispersion of Stormwater On-site/Reduction of Impervious Areas/Retention of Native Vegetation: 2.2.1, 2.4, 2.9, 2.32, 2.33, 2.36, 4.3, 4.4, 5.1	9	8
Total number of comments received:	*186*	

Of the 186 comments listed in Table 2-1, the top six topics account for 105, or 56% of the comments. The top six most common comments included the following, in order of priority:

- Retrofit Existing/Bioretention/Decentralized CIP,
- Water Quality,
- Low Impact Development,
- Funding,
- 2005 Manual/Design Standards, and
- Inspection/Inventory/Maintenance.

Additional comments were received from DOE and PSP as well as Washington State Department of Fish and Wildlife on the revised plan as noted in the sources below.

Although not listed in Table 2-1, many of the comments were similar to those presented earlier and have been addressed in the following sections of this Addendum.

1. State Department of Fish and Wildlife Comment Letter Re: Allyn UGA SWM Plan, July 24, 2007, Brad Sele, Regional Shellfish Manager, Fish Program, Region 6
2. Meeting with Kim McKee of Ecology and Bruce Wulkan of the Puget Sound Partnership, July 18, 2007
3. E-mail of additional comments on the revised draft was received from Bruce Wulkan of the Puget Sound Partnership on August 15, 2007.
4. E-mail of additional comments on the revised draft was received from Kim McKee of the Washington State Department of Ecology on August 16, 2007.

2.3 Master Comment Response Matrix

The County developed a Master Comment Response Matrix that includes comments received through public meetings, comment letters, emails, and regulatory meetings, as referenced in the preceding section. These comments from the public, regulatory agencies, Tribal and stakeholders have helped guide this second review and update of the proposed SWM Plan. As a result, the revised plan includes additional information on existing conditions related to natural resources, together with a comprehensive program to provide for future development and comply with existing and future regulatory requirements.

The Response to Public Comments (Section 4) along with the revised SWM Plan presents the County's responses to all of the public comments received to date, and attempts to be responsive to each major topic, as listed above. These public comments, along with various regulatory requirements and local water quality, flow and habitat information, have also been used as the primary sources of guidance for the development of the comprehensive Countywide SWM strategy presented in Section 3.

Section 3—Countywide Comprehensive SWM Program

3.1 Stewardship of the Region's Natural Resources

Objectives of the Countywide Comprehensive SWM Planning Process

Mason County is blessed with a wealth of natural resources that significantly add to the local quality of life and the economy of the region. The County, recognizing its role as one of the primary stewards of these resources, is in the process of developing a countywide stormwater management plan (SWM Plan) to both protect and enhance these resources. The primary objective of this plan is to protect water quality, shellfish, habitat, groundwater and their supporting natural processes and functions, to continue to promote and guide new development and to be responsive to existing and future regulatory requirements.

3.2 County's Watershed Planning Process

Prioritization of Stormwater and Water Quality Problems

The County's SWM Program is in its initial stages of development. The County has not had the opportunity to conduct watershed planning or to complete a comprehensive inventory of stormwater facilities or to assess the problems that stormwater runoff may be causing throughout the County. However, as a result of this initial SWM planning process, research has been undertaken and interviews have been conducted, the results of which suggest that the County's current stormwater related water quality problems consist of the following:

Nutrient and fecal coliform loadings into sensitive receiving waters.

Research by the University of Washington and monitoring by Ecology, County and State departments of health, and State Fish and Wildlife suggest that nutrients and coliforms are having major impacts on local and regional receiving waters and their associated habitat areas. Failing and poorly designed and maintained septic systems have been identified as one of the major sources, and septic maintenance and monitoring programs have been proposed. Also, centralized wastewater collection, conveyance and treatment systems have been proposed for the Belfair and Hoodsport areas, and a small system has already been installed at the end of North Bay near the Allyn UGA.

A second major source of nutrient and coliform pollution is through stormwater runoff. While stormwater runoff does not generate these pollutants, it does pick them up from various land uses, concentrates them and transports them directly into sensitive local receiving waters. Most of the runoff in the County is not adequately detained or treated, which causes both flow and habitat problems and increases the need for effective stormwater management, particularly within the more urban and developing areas of the County.

Impacts to water quality, shellfish and habitat areas.

The impacts to local natural resources within Hood Canal and the southern reaches of Puget Sound are well documented. Monitoring within the areas adjacent to the Allyn UGA in North Bay and within the Belfair UGA in the south end of Hood Canal suggest that nutrients, and fecal coliforms from surface water runoff and failing septic systems are degrading water quality, freshwater streams and fish habitat, as well as saltwater shellfish rearing areas. Substantial documentation of these impacts has been recorded and on-going monitoring programs continue to provide updated status of local conditions on an annual basis. Many of the coliform monitoring stations show a steady increase in concentrations which are threatening recreational and commercial shellfish harvesting, and if unchecked will result in the decertification of many of the existing commercial harvest areas.

Again, inadequately detained and treated stormwater runoff from developed areas has been identified as one of the primary causes of continued and increasing loadings of pollutants and their resulting degradation of water quality and threats to adjacent shellfish rearing areas. Additional controls of runoff from developed areas, as well as runoff from future developed areas, are being mandated by regulatory agencies, stakeholders and the public. Additional development controls and guidance have been suggested in the County's SWM Planning processes to minimize these impacts, as described below in this Addendum.

Erosion and sedimentation.

Erosion and sedimentation impacts generally have two major sources that often are interrelated, further enhancing the problem and the resulting impacts. Significant erosion can occur when a new site is graded for development. After development, the increase in surface water flows often causes downstream channel erosion and undercutting of stream banks. Deposition of eroded sediments smothers sensitive spawning areas and if discharged into marine areas can also degrade shallow shellfish rearing areas. Addressing erosion related problems involves the development and enforcement of effective development standards and design criteria, as well as the effective management of onsite and downstream surface water runoff.

Flood control.

Flooding is common in certain parts of the County and is often the direct result of land use changes. Having good land use controls, including comprehensive planning, design standards and permit review along with enforcement processes are the primary tools for the control of flooding. Usually flooding is the cumulative effect of a series of major land use changes that occur over time throughout the watershed. Uncontrolled runoff with its associated property and habitat damage is the result of these changes. The effective control of flooding is directly related to the effective control of surface water, both during and after

land use alterations. A comprehensive stormwater management program is needed within the County to support the County's flood reduction and management efforts.

3.3 Countywide Comprehensive SWM Management Strategy

The County's proposed stormwater management strategy is a phased approach that initially focuses on the protection and enhancement of the County's most sensitive natural resources by addressing the SWM issues in the urban areas of the County. This strategy includes the development of a Comprehensive Countywide SWM Plan, with more in-depth technical studies in the areas of Allyn, Belfair, Hoodsport, Union and impacted sensitive areas such as Oakland and Annas Bays.

The geographic extent of this initial phase of the countywide SWM strategy, as shown in Figure 3-1, includes:

- The Urban Growth Areas of Allyn and Belfair,
- The Rural Activity Centers of Hoodsport, Taylortown (I and II), and Union, and
- The identified Water Quality Sensitive Areas of Oakland Bay and Annas Bay, as described in the Oakland Bay Action Plan and Annas Bay Closure Response Strategy.

Other urban and sensitive natural resource areas may be added in the future during the annual review and update of the proposed Comprehensive Countywide SWM Plan.

3.4 Focus of the Comprehensive Countywide SWM Plan

Emphasis on Water Quality and Effective SWM in Urban Areas

The County is committed to enhancing water quality and promoting effective stormwater management especially in its Urban Growth Areas (UGAs) and rapidly urbanizing areas, both within and adjacent to sensitive natural resource areas. This SWM planning strategy, as documented in the Comprehensive Countywide SWM Plan currently under development, is intended to address the drainage related impacts of existing and future development and to protect and enhance water quality, shellfish, habitat and groundwater. *(The draft Comprehensive Countywide SWM Plan is scheduled for release to the public in the spring of 2008.)*

Developing a Comprehensive Countywide SWM Plan at this time allows the County to address immediate water quality, shellfish, and habitat needs and the requirements of the Puget Sound Water Quality Management Plan, as well as begin to prepare the County to come into compliance with a future National Pollution Discharge Elimination System (NPDES) Phase II Municipal Stormwater Permit.

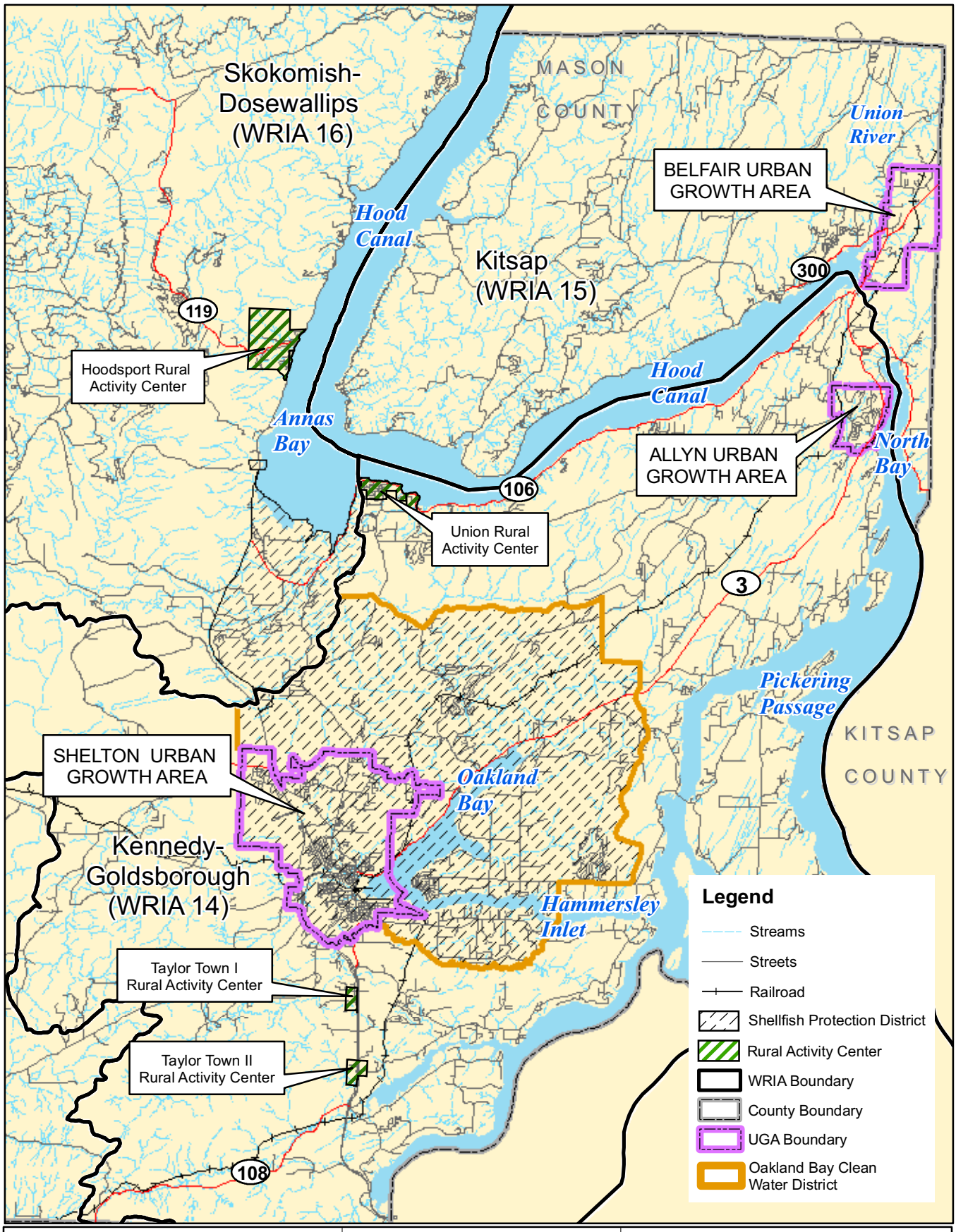

Figure 3-1
Mason County SWMM
Planning Area Map

N
W E
S

0 2 4 Miles

411 North 5th, P.O. Box 279
Shelton, Washington 98584
Phone: (360) 427-9670
Fax: (360) 427-8425

10230 NE Points Drive, Suite 400
Kirkland, Washington 98033
Phone: (425) 822-4446
Fax: (425) 827-9577

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3.5 Relationship to Allyn and Belfair SWM Plans

The Allyn and Belfair UGA SWM Plans will complement and support the development of the Comprehensive Countywide SWM Plan. These SWM Plans have been developed by:

- Collecting information and characterizing the various drainage areas,
- Evaluating existing facilities and planning for future capital needs,
- Reviewing and evaluating regulatory compliance/programmatic needs in comparison to the County's existing surface water management program,
- Combining the recommended capital and programmatic needs together, along with costs and a schedule for implementation, to form the SWM Plan, and
- Providing a financial plan, outlining various potential funding mechanisms and amounts of annual revenues.

A similar SWM Plan for the Hoodsport area of the County is currently being developed and is expected to be released for public review in the spring of 2008. Shellfish protection and recovery plans are also under development for the Oakland and Annas Bay areas. As these SWM technical documents for the County's UGAs, Rural Activity Centers (RACs), and Water Quality Sensitive Areas (WQSAs) are developed, they will be reviewed by the public and approved by the BOCC and included as technical appendices to the County's Comprehensive SWM Plan.

3.6 A Comprehensive Watershed-Based Approach

Elements of the Countywide Comprehensive SWM Plan

Similar to the Allyn and Belfair SWM Plans, the County's Comprehensive SWM Plan will assume a watershed based management philosophy for the protection of natural resources and the establishment of effective stormwater management throughout the County. This means that the County's Comprehensive SWM Plan will be based upon the technical, programmatic, capital and funding approach needed to achieve natural resource protection objectives, compliance with the PSWQMP and future Phase II NPDES Permit and support continued growth. It will emphasize the protection and enhancement of the natural resources throughout the County. It will include a series of programmatic elements, as well as a capital improvement program (CIP) for both the short- and long- term planning periods. The short term CIP will support growth over the next six years, while the long term CIP will address ultimate buildout, as defined in the County's Comprehensive Plan.

In the more urban UGAs, RACs, and WQSAs, the adoption of a comprehensive SWM philosophy will require:

- *SWM Program:* Development, adoption and annual implementation and funding of a programmatic approach to stormwater management throughout the area, as presented in the PSWQMP and future NPDES II Permit (and described in the revised SWM Plan and in this Addendum),
- *Design Criteria for New Development:*
  - Adoption of the 2005 Ecology Manual for all new development,
  - Adoption of Low Impact Development (LID), as a requirement of all new development,
  - Review and possible adoption of revisions to the Development Standards of the Comprehensive Plan, requiring all future development be conducted according to current low impact principles that include minimizing new impervious areas, optimizing the preservation of natural vegetation (including the natural understory beneath the tree cover), disconnection of roof drains, infiltration of site runoff, and dispersion of surface runoff sheetflows into the remaining natural vegetation areas.
- *Existing Development:* Retrofit of existing impervious areas to detain and treat runoff from existing development prior to discharge using LID techniques (i.e. bio-retention),
- *County Road Design:* Treating the runoff from all new County roads using LID techniques (i.e. bio-retention, water quality treatment filters, etc.), and
- *Funding:* Establishment of adequate local funding to implement the annual Comprehensive Countywide SWM Program.

In the more rural areas of the County, the adoption of a comprehensive SWM philosophy will be conducted in phases, on an as needed basis or until an NPDES II Permit is issued to the County. The SWM Program for the more rural areas will require:

- *SWM Program:* Continued use of the County's existing SWM design criteria,
- *Design Criteria for New Development:* Continued use of the County's existing SWM development standards and zoning codes,
- *Existing Development:* Annual inspections and drainage system enhancements by the County Road Maintenance Crew to address small, localized flooding, water quality and sensitive area impacts on an as needed basis,
- *County Road Design:* The treatment of runoff from all new County roads using LID techniques (i.e. bio-retention, water quality treatment filters, etc.), and
- *Funding:* The establishment of adequate local funding to implement annual Comprehensive Countywide SWM Program for the less developed areas of the County.

3.7 Funding and Implementation

Creation and Allocation of New Annual Revenues

One of the challenges in developing a new Comprehensive Countywide SWM Program will be in creating the amount of new revenue needed to annually develop and operate the

Program. Similar to the financial plans presented in the Allyn and Belfair SWM Plans, it is likely that various new revenue sources will need to be created and/or existing revenue sources will need to be reprioritized so that additional revenue can be directed to the new Comprehensive Countywide SWM Program.

Creating Levels of Service

In the development and implementation of Comprehensive Countywide SWM Program, as well as the SWM Plans for Allyn, Belfair, Hoodsport and other sensitive areas, different levels of service will need to be described for each of the SWM planning areas. At least two levels of service are anticipated.

The first is for SWM service within the more rural areas of the County. The second would be for SWM service within the more urban areas of the County, including the UGAs, RACs, and WQSAs. In general, the level of service and types of service will be determined by the amount and type of revenue generated from within each service area. Annual SWM priorities, work programs, capital project (CIPs) and staffing levels would be defined according to the needs and available revenues from within each service level.

It is likely that services within the rural areas would include those services similar to those that are presently being provided, while the services within the more urban areas would include additional design criteria for new development, enhanced maintenance, water quality monitoring, inspection/enforcement and capital projects to enhance water quality and mitigate impacted habitat areas.

3.8 Implementation and Annual Reviews to Update and Refine SWM Plan

The implementation and funding of the Comprehensive Countywide SWM Plan, as well as the Allyn and Belfair SWM Plans, will emphasize an initial series of recommended, high priority SWM programmatic activities and capital projects. The development of one or more dedicated funding sources has been recommended to meet projected annual revenue needs, however, additional revenues will likely be needed. It is important to recognize that this is not the end of the planning process; rather it is just the beginning. Throughout the continued development and implementation of these SWM Plans, the County will continue to gather data and learn more about the natural systems and the effectiveness of the various SWM initiatives. This information will be used on an annual basis to continue to evaluate the effectiveness of the proposed Plan. Using the process of adaptive management, further refinement and adjustment of the Plan will continue to enhance its overall effectiveness.

Section 4—Response to Public Comments: Plan Revision

4.1 Overview: Summary of Comments

As summarized in Table 2-1 and the Master Comment Response Matrix referenced in Section 2, numerous comments were received on the draft plan from several sources. From a review of these comments several major common topics emerged that were used to help structure the content and format of this Addendum. These common topics were developed into additional stormwater management planning activities, which were used to further expand and refine the proposed SWM Plan for Belfair, as well as create the foundation for the Comprehensive Countywide SWM Program. The additional SWM activities that resulted from the public review/comment process included the following:

- Additional documentation and assessment of existing ***water quality*** and natural resource conditions,
- Additional documentation and analysis of existing SWM ***drainage problems***,
- Development of a ***programmatic approach*** to SWM,
- Enhanced and expanded SWM design criteria and standards for new and redevelopment that emphasize ***low impact development*** techniques and promote water quality enhancement,
- Review and enhancement of the annual ***maintenance program,***
- Redesigning the approach to capital facilities from a centralized, flow control approach to accommodate new development, to a ***decentralized onsite approach*** that emphasizes reduced impervious areas, onsite infiltration, retention of native vegetation and onsite dispersion of excess surface flows (i.e. low impact development),
- ***Retrofitting existing development*** using low impact development techniques (i.e. bio-retention),
- Defining the proposed ***water quality monitoring program***,
- Use of an expanded ***public education and involvement*** program,
- Improved inter- and intra-***agency coordination***, and
- Reprioritization and expansion of available ***funding***.

Each of these SWM Program elements of the proposed SWM Plan for the Belfair UGA have been further enhanced from the revised July, 2007 draft of the SWM Plan in order to increase the protection and restoration of natural resources and respond to local water quality, shellfish and habitat concerns, as voiced through the public comment process. Each revised, or refined SWM Program element is discussed in more detail in the following sections.

4.2 Existing Conditions: Characterization of Water Quality and Natural Resources

Comment Summary:
Numerous requests were made as to the need to conduct further research and document existing natural resource conditions, the condition of current water quality and the status of current recreational and commercial shellfish harvesting. Additional comments were made regarding the need to correlate these observed and documented impacts with the direct discharge of undetained and untreated stormwater runoff from commercial and residential development. Direction was given by regulatory agencies and stakeholders to develop retrofit plans to treat and detain runoff from existing development and establish controls for new development so runoff from future development was minimized and sensitive resource areas were protected.

Revised SWM Plan (July, 2007):
The revised SWM Plan included a section that characterized the study areas, consisting of the Urban Growth Areas, as defined in the County's Comprehensive Plan. While this review of the nature of the study area generally described the SWM Planning Area, it did not present a comprehensive view of the current state of research and monitoring. It noted water quality as an issue of regional concern and documented Ecology posted 303(d) listings and established TMDLs. Sensitive areas, consisting of wetland, stream buffers/habitat areas, fish bearing streams and aquifer recharge/protection were also recorded and mapped.

Addendum Response:
Due to the length of the report on local and regional water quality, shellfish and habitat resources and documented impacts from stormwater runoff, the text for this response has been included as Appendix A.

Budget Impact Related to Revised Plan (July, 2007):
Based on public comment and these technical findings, substantial changes have been made to the proposed SWM Plan to protect and restore water quality, shellfish rearing, stream and fish habitat areas, as well as protect sensitive areas and shallow aquifers.

The objective of the SWM planning process has shifted from the establishment of a capital improvement program to accommodate increased flows from future growth, to the development of a SWM Program that supports future growth, while also protecting and enhancing water quality and sensitive habitat areas.

As a result of this change in objectives, the entire focus of this SWM planning process has shifted, from the development of a centralized, regional system of detention, treatment and conveyance to accommodate future development to a decentralized approach that emphasizes the use of low impact development, infiltration, dispersion, and natural vegetation retention.

The various elements of this natural resource based SWM Program are discussed below.

4.3 Existing SWM Drainage Problems

Comment Summary:
A few citizens living within the UGA commented that the revised SWM Plan did not adequately document or address several localized existing drainage problems.

Revised SWM Plan (July, 2007):
The revised Stormwater Management Plan for the Belfair UGA contained runoff estimates and capacity evaluations for existing drainage conveyance facilities, as well as a summary of reported drainage problems. This information was gathered from site visits, field tours with County staff, and follow up interviews with County maintenance and WSDOT maintenance crews. Additional information was collected and additional engineering analyses of the culverts under SR3 were performed and documented in the revised plans. Key information from those plans is provided in the following summary.

4.3.1 Belfair UGA

There are no reported flooding problems at the existing culverts crossing SR 3 or NE Old Belfair Road, except where Mindy Creek crosses SR3. This culvert, if not maintained, can become clogged with debris resulting in localized flooding. An analysis was made of 20 of the culverts crossing SR 3 or NE Old Belfair Road to convey the 25-year peak flow assuming inlet control and a headwater to pipe diameter ratio of 1.25. Of the 20 culverts, 12 had adequate capacity and 8 were recommended for additional investigation of tributary flows and culvert capacity during annual maintenance activities.

On the west side of SR 3, north of the Romance Hill Road intersection, it is reported that there is frequent flooding of a yard of a residence just downstream from Mindy Creek. It is proposed that this problem be corrected as a part of the proposed SR 3 improvements by WSDOT. In the northerly part of the commercial area, it is reported that runoff is bypassing catch basins in a commercial area and running on to SR 3. This should be investigated by County maintenance personnel during annual maintenance and the excess flows should be redirected into the commercial drainage system.

Addendum Response:
Suggestions for increased annual inspections and a few local drainage studies and onsite fixes by the County maintenance crew have been proposed. These activities are consistent with the recommendations presented in the revised SWM Plan. Cooperation with WSDOT during annual maintenance and during the proposed revisions and expansions of SR3 also has been previously recommended.

Budget Impact Related to Revised Plan (July, 2007):
No additional costs have been identified. These small localized drainage studies and their associated fixes have been recommended for inclusion into the County's established annual maintenance program, as proposed in the revised SWM Plan.

4.4 Comprehensive Approach to SWM

Comment Summary:
Many comments were received about the need to make the proposed SWM Program comprehensive and to structure the SWM Program based on the requirements of the existing Puget Sound Water Quality Management Plan (PSWQMP) and the future National Pollution Discharge Elimination System (NPDES) Phase II Municipal Stormwater Permit.

Revised SWM Plan (July, 2007):
The revised SWM Plan, presented to the public in July 2007, proposed a number of programmatic SWM activities that were either required by the existing PSWQMP or would be required in a future NPDES Phase II Stormwater Permit. As requested by public comment, the existing and upcoming regulatory requirements of the PSWQMP and the Phase II Permit were used to provide the basic framework for a comprehensive, programmatic approach to SWM that also includes short and long-term capital needs to address existing conditions and future growth. These programmatic SWM elements, as presented in Table 8-1 of the revised plan, are summarized in this Addendum as Table 4-1.

Table 4-1—Recommended SWM Programmatic Elements and Costs											
SWMP Element	Recommended Action	Satisfies Program Needs			Costs ($1,000's)						
		PS WQMP	NPDES Phase II Permit	WQ Habitat Shellfish	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Total
1	**Public Education*** - SWM (LID) Brochure	X	X	X	$5	$5	$5	$5	$5	$5	$30
2	**Public Involvement*** - Organize Volunteers/Mtgs	X	X	X	$25	$25	$25	$25	$25	$25	$150
3	**Illicit Discharges (IDDE)** - Facility Inventory & Mapping	X	X	X	$0	$25	$25	$0	$0	$0	$50
4	**New Development*** - Ordinance - 05 DOE Manual - Ordinance - LID	X	X	X	$25	$25	$0	$0	$0	$0	$50
	- Training - 05 Manual - Training - LID	X	X		$25	$25	$0	$0	$0	$0	$50
	- Annual Review of O/M	X	X	X	$0	$10	$10	$10	$10	$10	$50
5	**Maintenance** - Annual Plus Enhancements	X	X	X	$25	$25	$35	$35	$35	$35	$190
6	**SWM Prog Implementation*** - Develop Tracking System	X	X		$15	$15	$10	$10	$10	$10	$70
	- Annual Program Evaluation	X	X		$0	$10	$10	$10	$10	$10	$50

7	TMDLs		X	X	$0	$0	$0	$0	$0	$0	$0
8	SWM Program Monitoring* (Addressed in Element #6)	X	X		$0	$0	$0	$0	$0	$0	$0
9	Reporting* (Internal)		X		$10	$10	$10	$10	$10	$10	$60
10	Basin Planning (Part of current Co. study.)	X		X	$0	$0	$0	$0	$0	$0	$0
11	Funding - Develop SWM Utility	X			$50	$50	$0	$0	$0	$0	$100
	- SDC Feasibility Study	X			$50	$50	$0	$0	$0	$0	$100
12	WQ Monitoring - Annual WQ Monitoring	X		X	$100	$100	$100	$100	$100	$100	$600
	Total:				$330	$375	$230	$205	$205	$205	$1550
	*Future County Staff (~ 1 FTE)				$55	$55	$50	$50	$50	$50	$310
	Outside Services				$275	$320	$180	$155	$155	$155	$1240

Addendum Response:
Based on additional public and regulatory comments, the revised SWM Plan (presented in July, 2007) was further expanded to include additional enhancements of the following SWM Program elements described below in Sections 4.5 to 4.11. The financial impact of these additional SWM activities is summarized in the revised financial plan presented in Section 4.12.

Budget Impact Related to Revised Plan (July, 2007):
In general, no additional revenue has been proposed for the annual implementation of the proposed revised SWM Plan. Annual revenues are projected to remain at about $400,000 per year, based on the multiple funding sources presented in the financial plan.

The funds proposed for baseline water quality monitoring ($100K) and the funds proposed for centralized capital facilities ($100K) in the revised plan have been re-assigned to accommodate the new SWM Program priorities established through the public review process, as discussed below and summarized in Section 4.12 of this Addendum. Note that in the revised budget for this Addendum, presented in Table 4-2, some additional funds have

been added to public education and illicit discharge detection and elimination in years 3, 4, 5 and 6.

4.5 Programmatic: Development Design Criteria-Emphasizes Use of 2005 Manual / LID

Comment Summary:
A common theme to both the public and regulatory comments, as well as those received from the Tribe and the shellfish industry, was the need for the County to adopt the Ecology 2005 Manual in order to protect sensitive areas. Numerous comments were also received recommending that the County also develop, adopt and require the use of low impact development (LID) throughout the UGA for all future development.

Revised Plan Response:
The revised SWM Plan recommended adoption of the Ecology 2005 Manual and the development of a new ordinance requiring LID throughout the UGA for all new development.

Addendum Response:
These two recommendations have not been changed in this Addendum. The County is intending to adopt the Ecology 2005 Manual and to develop and adopt a LID ordinance as part of the process to adopt this SWM Plan. The LID ordinance will be adopted concurrent to the adoption of this SWM Plan, as a modification to the County's existing land use criteria.

LID for all new County Roads: With the documented need to further control the impact of stormwater runoff, the County has also elected to modify theCounty Road Design Standards so that the treatment of runoff is mandated during the design and construction of all new County roads throughout the UGA. The water quality treatment standards will stress the use of water quality filters and the use of bio-retention in roadside swales, along with other LID techniques.

Budget Impact Relative to Revised Plan:
These SWM recommendations are consistent with the revised SWM Plan and do not require the allocation of additional annual SWM revenues, however, the treatment of runoff from all new County roads within the UGA will increase the price of future road projects. *(Those costs and the corresponding increases in County road projects have not been included in this SWM planning analysis.)*

4.6 Programmatic: Annual Maintenance Program-Review and Enhancement

Comment Summary:
Concerns were expressed by the regulatory agencies that runoff from existing County roads was not being properly detained or treated prior to discharge into local receiving waters. They suggested an enhanced maintenance program be put in place that updates current O/M practices and includes a new emphasis on the treatment of runoff from County roads prior to discharge into local receiving waters.

Revised Plan Response:
The revised SWM Plan stressed the importance of annual maintenance and recommended regular inspection of facilities within the UGA to continue to maintain vegetation, remove debris and enhance coordination with WSDOT in regard to conveyance systems under SR3. There was also the recommendation to begin to inventory the countywide SWM system of drainage facilities in anticipation of the upcoming requirement to establish an illicit discharge detection and elimination (IDDE) program.

Addendum Response:
This Addendum continues to emphasize of importance of regular annual maintenance by further recommending improvements in the annual maintenance program to conduct small localized drainage studies and construct small CIP fixes in the field on an as needed basis. County Roads has also made the commitment to enhance it efforts to detain and treat stormwater runoff within its roadside ditches by adding water quality treatment filters and other LID techniques, including bio-retention swales in order to reduce pollutant loadings to local sensitive receiving waters.

Budget Impact Relative to Revised Plan:
The annual SWM O/M program has been increased to conduct regular inspections of its major facilities serving the UGAs, to conduct small studies, to fix local drainage problems (an increase of $20,000 per year), and to begin to design and build water quality treatment facilities within roadside ditches (about $80,000 per year). (Note that this enhanced annual maintenance program would also include the short term CIP activities presented in the revised SWM Plan. Such activities include coordination with WSDOT and routine culvert inspection.)

4.7 CIP Strategy - Short-Term: Retrofit of Existing Development Using LID

Comment Summary:
One of the primary criticisms of the earlier drafts by the regulatory agencies was that the proposed SWM Plan did not address existing water quality problems or attempt to control their various sources. Agencies suggested that an effective SWM Plan for Mason County should contain adequate funding in the capital improvement program to detain and treat stormwater runoff from existing development before it was discharged into local receiving waters.

Revised Plan Response:
The revised plan, published in July, 2007, proposed to use annual water quality monitoring to define local water quality problems and their sources. This would allow the County to identify and prioritize existing water quality problems for future funding. Proposed water quality enhancement activities and projects would be designed and tailored to the nature and extent of the localized problem. The intent was that the highest priority problems would be addressed on an annual basis. Funding for annual water quality monitoring was proposed at $100,000 per year. No additional future funds were identified in the proposed capital program, or allocated to the fixes, that may be needed to address the identified problems.

Addendum Response:
An Overview: Using LID to Replace Traditional SWM Engineering Techniques: This Addendum proposes to revise the original approach to capital projects. Low impact development (LID) will be used to treat existing stormwater runoff, as well as address the stormwater capital needs associated with future development. The addition of water quality treatment to address existing problems is discussed in this section and is the first part of a two part capital improvement strategy. The second part is to continue to use LID techniques to address the stormwater needs of future development. Using LID to address future capital needs is presented in the following section, 4.8. This approach replaces the regional, centralized approach that was proposed in the revised SWM Plan to address the future capital needs within the UGA.

Using a LID type of an approach emphasizes the objective to reduce existing and future impervious surfaces, optimize the retention of natural vegetation, infiltrate on site as existing soils allow, and disperse runoff in a sheetflow manner into remaining naturally vegetated areas. This approach is in contrast to the traditional engineering approach that would typically route all runoff from the site into a network of regional collection and conveyance facilities that would lead to a series of large, onsite or regional detention and treatment facilities, where the runoff would be treated prior to its discharge to local receiving waters.

Using LID to Treat Existing Stormwater Runoff: Rather than relying on water quality monitoring and enhanced maintenance to address the existing water quality problems as presented in the revised SWM Plan, funds have been shifted from annual water quality monitoring to an aggressive program to retrofit the existing drainage system for water quality treatment. Using LID techniques, primarily in the form of bio-retention swales, runoff from existing development would be detained and treated prior to discharge. The emphasis would be on providing water quality treatment. The duration and type of detention would be primarily that needed to provide effective treatment rather than rate control.

The goal would be to design and build ten to twelve LID facilities throughout the most urban areas of the UGA over the next six years, approximately two per year. The approach would be to locate approximately five/six of these facilities on existing County property, primarily within the County road right-of-way.

The other five/six facilities would be located on existing private property, primarily on the downstream areas of the larger expanses of existing impervious surfaces, such as parking lots and outdoor storage/shipping receiving areas. Retrofitting possibilities for individual commercial properties include infiltration of roof runoff, collection and pretreatment of road and parking area runoff in rain gardens or catch basins with water quality filters, followed by infiltration and treatment within a soil matrix contained in a bio-swale/bio-retention type of design.

Working with existing residences and commercial businesses would be on a cooperative basis and it is the intent to develop incentives to entice the business community to participate. Financial partnering through the use of grants, loans, and other in-kind services is also being considered. (A technical overview of the use of LID (i.e., bio-retention facilities) for water quality treatment is presented below.)

Note that the County is also considering the treatment of runoff from County roads using water quality treatment filters of various designs and removal mechanisms to address the runoff from its impervious surfaces. One device involves the use of a bio-treatment medium within a suspended filter device that would be placed within an open drainage ditch along the County road. These devices would be used in replace of or in concert with the above bio-retention LID types of devices.

Technical Review of the Use of LID for Local Water Quality Enhancement: Retrofitting of existing commercial areas with water quality treatment facilities using LID will improve the quality of runoff being discharged from those areas. Bio-retention facilities are a good candidate for retrofits at commercial sites with Hydrologic Soil Type A and B soils as these

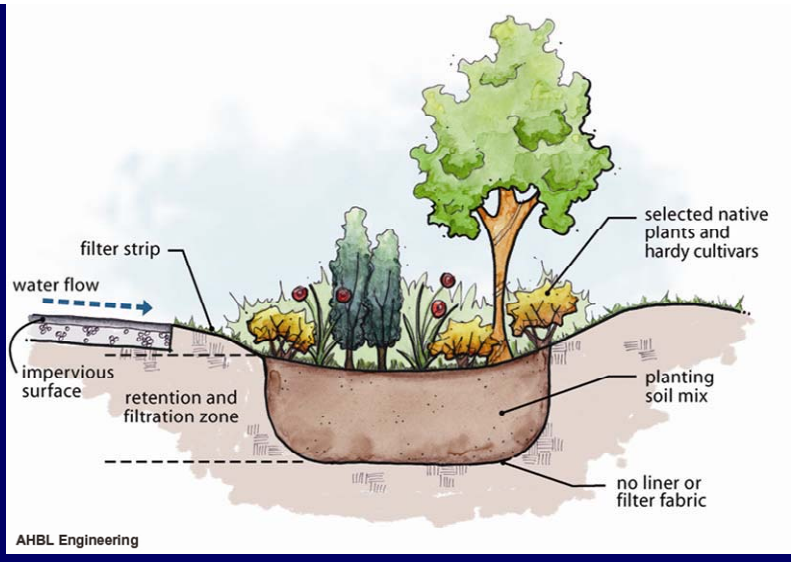
soils are well suited for infiltration of stormwater. With some design modification (i.e., adding an under drain) LID techniques could also be used in Type C and D soils.

The 2005 Ecology Stormwater Design Manual lists bio-retention facilities/rain gardens as one option to satisfy basic and enhanced water quality treatment requirements. The 2005 Ecology recommends both Appendix III-C of the 2005 Ecology Manual and The Low Impact Development Technical Guidance Manual for Puget Sound (LID Manual) for design guidance. Both design references area available on the World Wide Web.

For a typical commercial site (assuming 85 percent impervious cover and 15 percent landscape cover) located in outwash soil, approximately ten percent of the site is required for a bio-retention facility/rain garden (as determined using MGS Flood to size an infiltration facility that infiltrates at a rate of 1-inch per hour). For example, a 60-foot by 100-foot commercial lot (0.14 acre) would require a 600 square-foot bio-retention facility. The project cost, which includes construction and design costs, of a 600 square-foot bio-retention/rain garden is $39,000 (approximately $7 per square foot of area treated). Runoff from roofs does not require water quality treatment if kept separate from street and parking lot runoff. The development of a standard bio-retention design and set of specifications for the UGA that could be adapted to specific sites could help reduce the cost of implementing these facilities.

The following figure is taken from the LID Technical Guidance Manual for Puget Sound, 2005, courtesy of Puget Sound Partnership and illustrates a typical bio-retention cross section. This schematic is followed by photos of completed bio-retention facilities (also courtesy of Puget Sound Partnership).

In areas of till soils, where infiltration rates are low, a bioretention with an underdrain system or a different type of water quality treatment option, not relying on infiltration, may need to be selected from the Ecology list of treatment options (located in volume 5 of the 2005 Ecology Manual).



Bioretention cross section, without underdrain

From the LID Technical Guidance Manual for Puget Sound, 2005

Bioretention at Street Edge Alternatives (SEA) Project Seattle

Bioretention at medical center, Olympia

Photo by Bruce Wulkan, Puget Sound Action Team

Budget Impact Relative to Revised Plan:
The annual allocation of $100,000 to water quality monitoring presented in the revised SWM Plan has been re-assigned to provide detention and treatment of runoff from existing development throughout the UGA, with emphasis on the more commercial areas and areas of high traffic use.

The cost of a bio-retention facility on County right-of-way has been estimated to be about $40,000, depending on local soils and site conditions. Approximately two of these facilities would be designed and built every year over the next six years.

About $20,000 would be retained on an annual basis to monitor the performance of one representative bio-retention facility in order to measure performance. Collected information will be used to confirm treatment effectiveness and enhance future designs. (Note that the short-term CIP projects, consisting primarily of maintenance related activities, have been included in the enhanced annual maintenance program described in Section 4.6.

4.8 CIP Strategy - Long-Term: A Decentralized Approach Emphasizing LID

Comment Summary:
The regulatory agencies suggested that the County revise the Comprehensive Plan (Comp Plan) for the UGA in order to further enhance the use of LID techniques. The concept is to use additional LID approaches to address the drainage needs of all new development by changing the way the surface of the land is designed and laid out for future developed. This approach would take the form of revised development standards that would not change the densities presented in the Comp Plan, but would provide guidance that would reduce the amount of impervious area using LID approaches to land development. These land use standards would be used, and would work in concert with, the required 2005 Ecology Manual and the onsite LID ordinance. The goal of this type of an LID-based approach to land use development is to reduce/minimize the amount of new impervious surface, while optimizing the retention of native vegetation. It would emphasize the use of onsite infiltration and the dispersion and treatment of surface water runoff. If used on a uniform basis throughout the UGA, this type of a regional decentralized approach to stormwater management could be used in lieu of the design and construction of the traditional large, costly centralized collection, detention, treatment, and conveyance/outfall facilities that require large parcels of land for effective performance.

Revised Plan Response:
The revised SWM Plan promoted the use of LID by the development and the adoption of an LID ordinance that would work in concert with the Ecology 2005 manual. The SWM Plan promoted the use of onsite detention and infiltration. The onsite drainage systems would be designed to operate along with regional collection, detention and treatment systems that would be primarily paid for by developers at the time the site was developed. Depending on the effectiveness of these systems, the County may or may not be required (at a future date) to design and build additional regional facilities to protect sensitive downstream natural resources and address the accumulative impacts of numerous develops within common watersheds and drainage basins. Regulatory agencies characterized this type of an approach as a traditional, regional and centralized approach of providing stormwater management facilities to support new development.

Addendum Response:
The County recognizes the potential advantages of taking an LID-based approach to new development through the UGA. It supports the concepts presented by the regulatory agencies and recognizes numerous advantages of adopting such an approach. These advantages would include less disruption of native land resulting in less runoff, and less erosion and sedimentation. This approach would both preserve and protect natural resources by providing enhanced protection of onsite and downstream sensitive areas and

natural resources. It also reduces the cost of the County's long-term capital facilities program and may reduce future maintenance costs as well.

In supporting this concept of land development and an alternative approach to providing future capital facilities for SWM throughout the UGA, the County will commit to further develop and explore these concepts by developing the required land use standards and presenting to the public and BOCC for review during the annual review and update of the County's Comprehensive Plan.

Budget Impact Relative to Revised Plan:
In response to this LID type of an approach to providing long-term SWM CIP, the $100,000 that had been annually set aside for long-term capital projects has been reassigned to other SWM Program elements and priorities. These other SWM Plan priorities, based on public and regulatory comment, include enhanced maintenance consisting of localized drainage studies and small CIP fixes ($20,000/year) and treatment of runoff in roadside ditches ($80,000/year).

The long-term CIP project of relocating the Belfair Creek channel, costing $1.5M and scheduled for Year #15, has been put on hold, along with the Sweetwater Creek Fish Passage Improvements, until the short-term LID retrofit program for water quality treatment has been completed and evaluated.

4.9 Programmatic: Baseline Water Quality Monitoring

Comment Summary:
Numerous comments cited the significant amount of monitoring information available from state, local agencies and interest groups that documented water quality impacts from stormwater runoff to sensitive receiving waters and other natural resources. Several also expressed concern over the magnitude and immediacy of the need for action to correct observed and previously documented problems. Some suggested treatment approaches such as retrofitting existing development and the use of LID techniques. Others said that all runoff should be treated before it entered into local streams or receiving waters.

Revised Plan Response:
The June 2007 plan proposed the use of a baseline water quality and habitat study within the UGA to characterize the nature of stormwater runoff and establish the severity of its impacts. Results were to be used by the County to prioritize problem areas and guide the amount and type of future investments that would be needed to address local impacts. In the July 2007 revised SWM plan, this monitoring activity was expanded and additional funds were added to make water quality monitoring a major element of the new SWM Plan.

Addendum Response:
Based on the response of regulatory agencies and the public, as documented in Section 4.2 above, there appeared to be a general consensus that stormwater runoff was already a major problem for water quality, fish/habitat and shellfish within North Bay and the south end of Hood Canal. They suggested that, while additional monitoring would be helpful, the real need was to retrofit existing SWM facilities to detain and treat the runoff from all developed areas. As a result, most of the funds for the water quality monitoring program were shifted to help pay for retrofitting runoff from existing development. The remaining funds (about $20,000) will be focused on characterizing the water quality treatment effectiveness of the proposed bio-retention facilities that will be used to treat runoff from existing development.

Budget Impact Relative to Revised Plan:
No net financial impact—$80,000 will be shifted from water quality monitoring to detaining and treating runoff from existing development; $20,000 will be used annually to characterize the water quality treatment effectiveness of a bio-retention low impact development technique.

4.10 Programmatic: Public Education / Involvement

Comment Summary:
Regulatory agencies commented on the need for additional public education and outreach, as well as on-going public involvement. Most thought that a diversity of education and outreach techniques on an annual basis was needed. Some mentioned the need for the education of residents and the development incentives for them to take corrective action on their own properties. Many expressed the need to develop support for the plans through an on-going public involvement program.

Revised Plan Response:
The revised SWM Plan recommended distribution of a countywide brochure to the public addressing local stormwater pollution issues and homeowner solutions that included the benefits of LID and drew from available PSAT educational resources. The revised plan also included engaging community stakeholders in SWM planning and implementation within their respective UGAs. This included organizing volunteers to assist in Stream Team activities and various volunteer programs that could include water quality monitoring.

Addendum Response:
In this Addendum, the County has agreed to the establishment of a SWM Advisory Committee to assist County staff in the development of the County-wide SWM Plan.

As the County develops and implements various public education involvement activities, it would be good to expand the scope or theme of these activities so that everyone, both residential homeowner and business owner/operator, has a defined role in the protection, cleanup and enhancement of local water quality, streams, and shellfish rearing areas.

- For Homeowners: A Source Control Brochure that addresses ways that homeowners can reduce stormwater impacts through source control strategies such as reducing flows, disconnecting and directly infiltrating roof runoff, retaining or re-establishing vegetation onsite, carefully conducting pest management, reduction of lawn chemicals, proper disposal of pet waste, proper disposal of household hazardous wastes, etc.
- For Business: A Source Control Brochure that addresses ways that businesses can reduce stormwater impacts through source control strategies such as spill prevention, covering waste disposal areas to avoid stormwater contamination, integrated pest management, separating and infiltrating roof runoff, proper maintenance practices and frequencies, and retrofitting by adding bio-swales and rain gardens into their landscaping to enhance detention, infiltration, and treatment prior to discharge from their site.

Future activities may include: exhibiting at local fairs/public gatherings, use of the County's web site, mailings, brochures and volunteer programs for stream team plantings and water quality monitoring.

Budget Impact Relative to Revised Plan:
The revised SWM Plan provided $30,000 per year over the next six years for public involvement and education. The annual budget for public education has been increased to $25,000 per year in years 3, 4, 5 and 6.

4.11 Programmatic: Inter/Intra-Agency Coordination

Comment Summary:
In general, agency coordination did not receive much attention in the comments received from the public. The regulatory agencies, however, cited the critical need for coordination with WSDOT in order to address local road runoff and common water quality, habitat and receiving water objectives. Jointly-funded water quality detention and treatment projects were also suggested to address regional needs.

Revised Plan Response:
Intra-Agency Coordination: The revised SWM Plan recommended coordination with WSDOT on maintenance, creek relocations, streetscape improvements and joint-use stormwater facilities.

Inter-Agency Coordination: The revised SWM Plan also recommended internal coordination with County Transportation and Parks programs to incorporate LID and water quality benefits into transportation improvements and planned park locations within the UGA.

Addendum Response:
Stormwater impacts on receiving waters are from diverse sources and often result in cumulative effects from the various land uses within the watershed. Effective stormwater management requires teamwork from all the players/contributors to address those impacts. For this reason, this Addendum is including additional recommendations for both agency and internal coordination.

In the future, the County intends to increase its level of coordination and cooperation with various local and State agencies, especially WSDOT, City of Shelton and County Public Health. Cooperation is needed on such issues as the design and funding of common local SWM projects, establishment of common design criteria within UGA areas and integrated programs to protect shellfish and restore water quality. The joint implementation of the Oakland Bay and Annas Bay shellfish response plans is already underway and could be used as templates of how to work together effectively to achieve common natural resource goals. These activities would complement and be in addition to the coordination activities already presented and discussed in the revised SWM Plan (July, 2007)

Budget Impact Relative to Revised Plan:
The revised SWM Plan provided $30,000 per year over the next six years for public involvement and education. While no additional budget has been specifically recommended in this Addendum for inter/intra-agency coordination, the addition of a County SWM Program Manager will help facilitate the overall coordination of SWM activities throughout the County and the UGA. The cost of enhanced coordination should be able to be absorbed within SWM Program Element #6, SWM Program Implementation.

4.12 Programmatic: Funding

Comment Summary:
The regulatory agencies stressed the need for the establishment of adequate levels of revenue to effectively implement the proposed SWM Plan on an annual basis. They proposed setting up a countywide SWM utility and the establishment of developer impact fees. Other comments were received from the public that pointed to the need for the County to hire and train new staff to help develop and implement the proposed SWM projects and activities.

Revised Plan Response:
The revised SWM Plan developed and presented a financial plan that was annually supported by a diversity of funding sources that included the formation of a UGA-wide SWM Utility. Potentially available annual revenues of up to $374,000 to $440,000 were forecasted, from seven different revenues sources. Annual SWM Program revenue needs of about $400,000 were estimated. The SWM utility was estimated to bring in about $100,000 annually, based on monthly rates of about $120 per year (or about $5-$10 per month) for the average residential homeowner, with commercial land owners paying more based on the amount of impervious area on their parcel.

Addendum Response:
A revised financial plan for the SWM Plan has been established and is presented in this Addendum. An annual SWM Plan budget of about $400,000 has been retained, and the same revenue sources and annual estimates of revenue have been maintained. Projected annual expenditures match projected annual expenditures of about $400,000. The various financial changes recommended above are summarized in Table 4-2.

Table 4-2—Recommended Belfair SWM Program Elements and Costs

SWMP Element	Recommended Action	Costs ($1,000's)						
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yrs 7-26*
1	Public Education	$5	$5	**$25***	**$25***	**$25***	**$25***	--
2	Public Involvement	$25	$25	$25	$25	$25	$25	--
3	Illicit Discharges (IDDE)	$0	$25	**$25***	**$25***	**$25***	**$25***	--
4	New Development	$50	$60	$10	$10	$10	$10	--
5	Maintenance	$25	$25	$35	$35	$35	$35	--
6	SWM Prog. Implementation	$15	$25	$20	$20	$20	$20	--
7	TMDLs	$0	$0	$0	$0	$0	$0	--
8	SWM Prog Monitor (In #6)	$0	$0	$0	$0	$0	$0	--
9	Reporting* (Internal)	$10	$10	$10	$10	$10	$10	--
10	Basin Planning	$0	$0	$0	$0	$0	$0	--
11	Funding	$100	$100	$0	$0	$0	$0	--
12	WQ Monitoring: Baseline	$0	$0	$0	$0	$0	$0	--
	Programmatic Subtotal:	*$230*	*$275*	*$150*	*$150*	*$150*	*$150*	--
CIP								
1	Yrs1-6:WSDOT/Culrts (In #5)	$0	$0	$0	$0	$0	$0	--
2	Yrs7-26:Four Reg. CIP (In #5)	$0	$0	$0	$0	$0	$0	--
	CIP Subtotal:	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	--
Adden.								
4.6	Enhanced O & M: Study/Fixes	$20	$20	$20	$20	$20	$20	--

4.6	WQ Treatment of Rd Ditches	$80	$80	$80	$80	$80	$80	--
4.7	Retrofits for Water Quality	$80	$80	$80	$80	$80	$80	--
4.7	WQ Monitoring: Retrofit LID	$20	$20	$20	$20	$20	$20	
	Addendum Subtotal	*$200*	*$200*	*$200*	*$200*	*$200*	*$200*	--
	Total: (Avg = $384/yr)	**$430**	**$475**	**$350**	**$350**	**$350**	**$350**	--

**** Increased in the Addendum over the revised SWM Plan, July 2007.***

Budget Impact Relative to Revised Plan:

In general, the following recommendations have been made to the annual budgets presented in this Addendum:

- The $100,000 water quality monitoring program has been reduced to $20,000 to evaluate the water quality treatment effectiveness of bio-retention facilities; the $80,000 balance has been used to design and build water quality retrofit facilities.
- The $100,000 set aside annually for long-term centralized capital projects has been reassigned to other SWM Plan priorities listed below.
- Annual maintenance has been increased by $20,000 to conduct small localized drainage investigations and complete small CIP fixes in the field.
- A short-term CIP program costing $80,000 per year to retrofit the drainage system to detain and treat stormwater runoff from existing impervious surfaces has been proposed. The short-term CIP retrofit program consists of the design and construction of 10-12 bio-retention facilities throughout the more urbanized areas of the UGA over the next six years at the rate of about two facilities per year. Partnering with local property owners will be needed.
- The hiring of one staff person to develop, supervise and implement the County's SWM Program has been recommended. Staff responsibilities would includes the funding and implementation of both the Allyn and Belfair SWM Plans. Cost has been estimated to be about $50,000 to $80,000 per year, which could be split between the two SWM Plans. (Note that funding for a staff position can be realized if SWM Program Elements 1, 2, 4, 6, 8 and 9 are performed internally by County Staff.)
- Remaining funds, of about $80,000 annually, may be assigned to the enhancement of the annual maintenance program to review and upgrade O/M practices and include retrofitting County road drainage ditches to detain and provide water quality treatment.
- Note that as annual revenues increase and more knowledge and experience is gained in implementing the proposed SWM Plan within the UGA, this initial SWM service level as defined in Table 4-2, will be subject to review and revision on an annual basis as part of the County's annual budgeting process.

Section 5—Summary of Revisions to Original Draft SWM Plan

5.1 Link between the SWM Plan and WQ in Hood Canal

Throughout the development of this Addendum to the SWM Plan for the Belfair UGA, the County has focused on improving local water quality and its related stream/habitat areas. It recognizes and understands the direct link between clean stormwater runoff and the continuation of healthy shellfish rearing areas. It is for these reasons that:

- The entire SWM planning strategy has been shifted from supporting new development by collecting and concentrating stormwater runoff and constructing large centralized regional SWM facilities, to an entirely decentralized approach that is based on LID techniques that minimized the impacts of future land use changes, as well as promotes the design and construction of onsite LID systems.
- A facility retrofit program has been developed to detain and treat the runoff from existing development using LID techniques.
- County road runoff will begin to be treated by retrofitting existing facilities, as well as by adding water quality treatment to all new County road designs.
- The important role of regular maintenance has been developed and continues to be stressed, further expanding the need for adequate staffing and funding of O/M programs during the annual budget cycle.
- The adoption of the Ecology 2005 Manual and the development and adoption of and LID ordinance continue to be promoted and are recommended.
- Citizen and stakeholder input and involvement has been emphasized and expanded to include the development of a citizen advisory committee and a pubic process for the annual review and update of the SWM Plan(s). Citizen volunteers may also play a key role in future program implementation including water quality and habitat monitoring, as well as public education.
- The establishment of a self-sustaining dedicated financial program has been developed and has been promoted that includes the development of a stormwater utility, as well as the hiring of a supervisor to help guide the continued development and implementation of the County's SWM Program.

Section 6—Future Public Involvement and Future Updates to the Plan

6.1 Ongoing Public Involvement

The County has made the commitment to establish a SWM citizen advisory committee to help guide the development of the Countywide SWM Plan. It is expected that this group will continue to play an active role in the public review of the Countywide and Hoodsport SWM Plans, as well as in the annual updates to all of the County's SWM planning efforts which include future updates to the SWM Plans of Allyn and Belfair.

6.2 Future Updates to the SWM Plan

The County recognizes the cooperative effort needed for successful and effective SWM planning throughout the County. It intends to conduct an annual review of the effectiveness of each of these proposed SWM Plans and their ability to be integrated into a comprehensive and effective countywide strategy and implementation plan. Annual refinements to both the SWM Plan activities, as well as their associated budgets and associated service levels, are anticipated. This review and refinement will continue to occur through an open and well advertised public review process.

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Appendix A

Appendix A—
Water Quality, Fish, Shellfish and Habitat Report

Introduction

Water quality, shellfish, and freshwater and marine habitat conditions are vital water and natural resource issues in Mason County. This addendum to the Stormwater Management Plans for the cities of Belfair and Allyn includes detailed information regarding the status of existing conditions within Mason County as well as a summary of recommendations and on-going protection efforts for these areas of Puget Sound. This section of the amendment is organized to reflect the conditions of water resources in Mason County and, accordingly, is presented with a focus on Water Resource Inventory Area (WRIA) information.

Because this region of Puget Sound is so rich in natural resources, there are many organizations (agencies, private companies, and citizens) that are actively working toward the protection of water quality and aquatic habitat. This summary is meant to encapsulate the existing conditions with regard to water quality and shellfish and salmon habitat. Due to the broad scope of these issues and their importance to this region, the following review should only be considered a summary or overview of the present state of knowledge and the current activities underway to protect and enhance these regional resources.

Mason County includes four separate Water Resource Inventory Areas (WRIAs) including WRIAs 14 (Kennedy-Goldsborough watershed), 15 (Kitsap watershed), 16 (Skokomish-Dosewallips watershed) and 22 (Lower Chehalis watershed), as shown in Figure 4-1. Nearly the entire watershed area of WRIA 14 lies within Mason County (or about 85%, approximately 207,872 acres of the watershed's 244,173 acres). The primary freshwater, marine, and nearshore habitats are within the northeastern portion of WRIA 14 and the western portion of WRIA 15. The western portion of WRIA 15 within Mason County contains only 80,953 acres, or approximately 13% of the 631,196 acres within the WRIA 15 watershed.

The cities of Allyn is within WRIA 14, the Kennedy-Goldsborough watershed. The Allyn Urban Growth Area (UGA) is comprised of 1,167 acres in the watershed. Only a small portion of the WRIA 15 area, or about 2,328 acres, comprises the City of Belfair UGA.

Although the areas within these two UGAs are relatively small compared to the watersheds, the natural resources located within each of these areas, associated with the North Bay area of southern Puget Sound and the lower end of Hood Canal, are considerable.

The water quality, fish and shellfish conditions for WRIAs 14 and 15 are briefly described below. This review is presented according to the following topics:

Appendix A—
Water Quality, Fish, Shellfish and Habitat Report
Continued

Existing Conditions
Existing Water Quality Conditions
Existing Biological Resources
Shellfish
Salmonid/Fish Resources
Monitoring, Protection, and Enhancement

Mason County: Stormwater and Water Quality

Belfair and Allyn Urban Growth Areas
City of Allyn and North Bay
Water Quality
Shellfish
Salmonid Habitat: Stream and Marine Nearshore

City of Belfair and South Hood Canal
Water Quality
Shellfish
Salmonid Habitat: Stream and Marine Nearshore

Suggestions for Resource Management
Stormwater Management / Watersheds
Habitat
Freshwater: Stream/Riverine
Marine: Nearshore Habitats

Existing Conditions

Existing Water Quality Conditions

The quality of water in many of the WRIA 14 and 15 streams, lakes, and nearshore areas has been degraded, likely due to a combination of various land use activities including, stormwater runoff, development of impervious surfaces, logging practices, wastewater from septic systems, and agricultural activities. The Union River and parts of Southern Hood Canal, Oakland Bay and Hammersley Inlet are on the most recent 303(d) list of impaired waters because of high fecal coliform bacteria and/or low stream temperatures.

Water quality problems have lead to shellfish harvesting closures in several WRIA 14 and 15 areas in Mason County including Oakland Bay, Hammersley Inlet, Pickering Passage, Annas Bay, and Hood Canal Station #9, as shown in Figure 4-1. These areas have been closed to shellfish harvesting because of high fecal coliform concentrations, and are considered as threatened shellfish growing areas by the Washington Department of Health (WDOH) (Figure 4-2). These closures have been linked to stormwater runoff and failing onsite sewage systems, and are threatening the shellfish industry.

Ecology is currently working to set Total Maximum Daily Loads (TMDLs) for both nearshore and freshwater areas with observed water quality problems. These include the fecal coliform TMDL for the Union River that was written in 2001, and the fecal coliform and temperature TMDLs currently being developed for Oakland Bay.

Existing Biological Resources

Shellfish

Mason County is an important shellfish rearing and harvesting region of Puget Sound. There are currently many areas for both the public and private harvest of a variety of species including oysters, clams, mussels and geoducks**.** Particular attention is being paid to the area near the Allyn UGA within North Bay, which contains the Olympia oyster—the only native oyster species in the Washington State. This species of oyster is currently a candidate species for state listing under the Washington State Endangered Species Act and is a species of concern under the federal Endangered Species Act (ESA).

The shellfish resources throughout Puget Sound are being threatened by stormwater runoff, septic discharges, and other types of pollution. Many shellfish rearing and harvesting areas have been impacted. Some of the public and commercial harvesting areas are now decertified

and others continue to be threatened by increasing development and its associated stormwater runoff. Within the Mason County area two shellfish protection/enhancement districts have been established. One within the Annas Bay area of Hood Canal and the other, covering a much larger geographic area, to restore shellfish resources within Oakland Bay. These shellfish areas are shown in Figure 3-1 as sensitive water quality areas.

Salmonid/Fish Resources

WRIA 14 streams and the Hood Canal nearshore habitat support a number of salmonid species. Unfortunately, the most productive habitats such as salt marshes, lagoons, and shallow bays have already been severely altered or lost within the nearshore areas of Mason County (Kuttel, 2002). Summer and fall chum, coho, and chinook salmon, as well as steelhead and both anadromous and resident coastal cutthroat trout use the streams draining to and the neashore waters of Hood Canal. Of these species, Hood Canal summer chum salmon and Puget Sound Chinook were listed as threatened by the National Marine Fisheries Service under the ESA in March 1999.

Forage fish such as surf smelt and sand lance, both important food species for anadromous salmonids, also use the nearshore. These species spawn near the high tide line on sand and gravel beaches found along the intertidal zone in Mason County.

Within the Belfair drainage, the Union River and its associated tributary streams is especially important to the rearing and sustaining of many of the various salmonid populations listed above. Equally important is the Sherwood Creek watershed adjacent to the Allyn UGA, which currently also supports a variety of salmonid species. Both the Union River and Sherwood Creek systems and their salmonid resources are examined in greater detail in the following sections.

Monitoring, Protection, and Enhancement

To ensure that these resources are maintained, various regulations, programs, and monitoring efforts are in place to help protect and maintain ecosystem health. New regulations have recently been established requiring Puget Sound health officers to designate Marine Recovery Areas (MRAs) where specific water quality problems have been identified.

Under these new regulations, MRAs must be designated when the Mason County health officer determines off-site stormwater systems (OSS) are a significant factor contributing to concerns associated with the degradation of shellfish growing areas. MRAs may also be designated when marine waters are listed by the Department of Ecology (Ecology) for water

quality degradation, including low dissolved oxygen levels, fecal coliform bacteria, or high nitrogen concentrations.

Under these regulations, the 2006 legislation directed the Mason County Department of Health Services and Mason County's health officer (as well as the other 11 Puget Sound counties) to take further actions to reduce fecal coliform bacteria pollution and the degradation and loss of marine life in Hood Canal and other marine waters in Puget Sound caused by low-dissolved oxygen conditions. It is envisioned that these MRAs will coordinate with existing TMDL and shellfish recovery districts, integrating action plans and correlating monitoring and data interpretation.

Mason County Stormwater and Water Quality

Within Mason County, the transformation or urbanization of landscapes from rural to urban land uses has resulted in an increase in impervious surfaces and associated stormwater runoff. During urbanization, forests are cleared and soils are stripped, compacted, and covered over with roads, buildings, and other impervious surfaces. Under this altered scenario, the precipitation that was previously taken up by native vegetation or that moved slowly into and through the soil layer as subsurface flow is now converted to surface overland flow. This results in changes in stormwater quantity and quality.

Stormwater quantity is altered through the combination of reduced retention and enhanced conveyance, resulting in changes in seasonal runoff patterns such as lower stream baseflows in the summer, and more stormflow events with higher peak flows that rapidly rise and fall in the winter (Booth 2000).

In 2004, the Puget Sound Action Team (PSAT) conducted a literature review of studies linking human modification of the natural landscape with direct and significant effects on the condition of aquatic ecosystems. Both streams and nearshore marine environments were evaluated, and the primary impacts included the fragmentation and loss of habitat, as well as the degradation of water resources and water quality (Glasoe and Christy 2004). One area that was identified as being especially sensitive to changes in stormwater runoff was the nearshore environment used to grow shellfish.

The PSAT found that shellfish growing areas receive pollution along three main pathways: (1) direct discharges (sewage outfalls, boaters, marine mammals, etc.); (2) subsurface flows (shoreline onsite sewage systems); and (3) overland flows (stormwater runoff and stream flows) (Glasoe and Christy 2004).

The studies reviewed by the PSAT also documented high levels of selected pathogens in stormwater discharges. They determined that fecal coliform bacteria concentrations are influenced by several factors including rainfall, land uses, fecal pollution sources, and runoff potential of different surfaces and landscapes (Glasoe and Christy 2004). This is the same correlation identified by Ecology and WDOH, which observed a significant rise in fecal coliform concentrations during storm events within the Mason County UGA's.

It has been shown that moderate levels of development within Puget Sound watersheds (10 to 25 percent impervious cover) degrade aquatic habitat quality, including shellfish growing areas, and the degradation increases as development intensifies (Booth 2000; May et al 1997). Low impact development (LID) strategies were identified in several studies in the literature review (Glasoe and Christy 2004) as the most effective means of minimizing the impacts of stormwater runoff rather than strictly relying only on structural BMPs. LID strategies are being adopted by many jurisdictions in King, Snohomish, and Thurston Counties as an effective development strategy to minimize stormwater impacts. These same measures would also benefit Mason County in improving water quality conditions within both freshwater and marine environments.

Belfair and Allyn Urban Growth Areas

Water quality in and around both the Belfair and Allyn UGAs has been reported as degraded (see below for specific examples). Water quality degradation in these areas is associated with both marine and freshwater systems, and is a source of concern for shellfish harvest, salmonid and forage fish habitat, and recreational usage of aquatic resources. Currently, fecal coliform bacteria levels represent the primary contaminant of concern in both the Belfair and Allyn areas.

City of Allyn and North Bay

Water Quality

The City of Allyn and the surrounding area comprise the watershed of North Bay (Figure 4-3), and include important shellfish rearing areas, as well as habitat for salmon and forage fish. This area has a long history of marine water quality concerns stemming from runoff associated with both shoreline and upland sources; in particular, on-site sewage system failures in the early '90s led to closure of many shellfish beds. Although the Allyn Wastewater Treatment Plant improved the marine water quality from failing septic systems

at the time, the area is currently showing a continued overall decline in water quality conditions, principally as a result of elevated fecal coliform levels and low dissolved oxygen concentrations. Both stormwater runoff and septic system discharges are thought to be some of the primary sources for these pollutants (i.e coliforms and nutrients), which are contributing to low dissolved oxygen concentrations within adjacent receiving waters.

The North Bay area associated with the City of Allyn has been monitored by the Washington Department of Health (WDOH) for the past ten years (Figure 4-4). Data from the 2006 collection period indicates that several of the monitoring areas have been downgraded to a "threatened" status (stations #1, #7, and #575) or listed as areas "of concern" (stations #11, #12, and #548) due to water quality contamination associated with elevated fecal coliform bacterial levels. WDOH is currently investigating sources of contamination for North Bay. Stormwater runoff, currently untreated in the Allyn area, likely provides much of the non-point source pollution to marine nearshore areas (Kim Zabel, pers. comm.).

Shellfish

North Bay is considered a shellfish protection area by the WDOH, and it is also on the Washington State Department of Ecology's (DOE) 303(d) list for fecal coliform bacteria contamination. Additionally, the WDOH has prohibited shellfish harvesting along beaches immediately adjacent to Allyn to the southeast because of pollution concernst, and numerous other locations are either threatened or of concern due to elevated bacteria levels (see above). Areas designated as threatened or of concern by WDOH are based on assessments of threats to shellfish growing areas, and in the case of North Bay, these threats are based on bacterial sampling levels and standards established by the National Shellfish Sanitation Program (NSSP).

Pickering Passage is located just to the south of North Bay, and marine water from Pickering Passage mixes with water in North Bay—thus, water quality conditions in Pickering Passage are directly related to water quality in North Bay. The WDOH summary shows that all water quality monitoring stations in the approved portion of the shellfish growing area in Pickering Passage (with the exception of station #57) pass the NSSP water quality standard(Figure 4-5). Sampling station #57 fails the NSSP "approved" water quality standard, and the WDOH report also indicates that stations #52 and #58 are "threatened" and station #66 is "of concern" due to elevated bacteria levels.

Because the Pickering Passage area fails to meet the shellfish classification standards, WDOH recommends that a comprehensive evaluation be conducted to determine the appropriate classification for the area. Furthermore, WDOH recommends that a pollution

source investigation should be initiated to identify and determine the source(s) of contamination to Pickering Passage.

Salmonid Habitat: Stream and Marine Nearshore

Stream Habitat: Salmonid habitat in the North Bay area consists of nearshore habitat in the bay as well as the stream habitat associated with Sherwood Creek, Anderson Creek, and Lake Anderson. Sherwood Creek flows from Mason Lake into Case Inlet in the Puget Sound, and Anderson Creek confluences with Sherwood Creek to the southof Allyn. The Washington Department of Fish and Wildlife identify Sherwood and Anderson Creeks as salmon-bearing streams, with several different species utilizing or potentially utilizing the in-stream habitat. Fall Chinook are documented as occurring in the lower portion of Sherwood Creek, and spawning habitat for coho salmon exists throughout the Sherwood and Anderson systems, with a documented presence of coho in several tributaries to both creeks. Spawning habitat for summer and fall chum exists in the Sherwood and Anderson Creek, and presence of fall and summer chum is either documented or presence is presumed in both creeks. Winter steelhead are documented as occurring in the mainstem Sherwood Creek, and spawning habitat for this species is found in the Anderson Creek system. The outlet from Lake Anderson provides rearing habitat for both coho and winter steelhead.

Marine Nearshore Habitat: Nearshore habitat associated with the Allyn UGA occurs along the western shoreline of North Bay. The nearshore habitat provides critical rearing and estuarine habitat for a variety of different species, in particular the salmonid species. Juvenile salmonids use nearshore habitats for several key life history functions. These habitats provide migration corridors, food production, and refuge from both predators and high-energy water waves (Mason 1970; Mac Donald et al. 1987; Thorpe 1994; Aitkin 1998).

In addition, all salmonid juveniles utilize estuarine and nearshore environments to move from their natal stream out into the ocean (Williams and Thom 2001). This is a physiologically complex transition and the estuarine environment provides a gradual transition for juveniles to adjust (Simenstad et al. 1982). The nearshore environment also contains marine vegetation associated with estuarine and nearshore marshes which provides shelter to rearing fish by protect juvenile salmon from turbulent wave action (Aitkin 1998).

Nearshore habitat associated within North Bay and Case Inlet contains habitat associated with documented forage fish presence, eel grass beds, mudflats, and salt water marshes, and intact portions of the nearshore riparian zone. A high value estuary occurs at the mouth of Sherwood Creek. Salmonid species known to utilize this nearshore habitat include Chinook, coho, chum, sea-run cutthroat, steelhead, sockeye, and bull trout. Issues of concern in the

nearshore habitat associated with North Bay include water quality (fecal coliform, low DO, nitrogen loading, etc.), shoreline armoring, loss of nearshore riparian vegetation, and issues associated with stormwater and wastewater discharge.

City of Belfair and South Hood Canal

Water Quality

Many of the marine water quality concerns described for the City of Allyn also pertain to the City of Belfair. The area of Hood Canal associated with Belfair is currently listed as prohibited for shellfish harvesting by WDOH due to poor water quality. The Mason County Department of Health Services is currently working with WDOH to increase sampling in the Belfair area, as well as to identify bacterial pollution sources within this area.

In addition to the concerns in Hood Canal, water quality in the Union River is a concern. The Union River basin is located in a largely rural setting with few prominent urban areas or major point sources of pollution. Belfair, located near the mouth of the Union River, is the largest urban area in the basin (Figure 4-6). Increasing amounts of impervious surface in developed areas in and around Belfair may be decreasing groundwater recharge, increasing erosive storm flows, and directly delivering pollutants to the Union River.

Recent storm sampling of streams draining the Belfair urban area show high bacteria concentrations in runoff (Ecology, 2003), and there is currently a TMDL and a water cleanup plan for the Union River for fecal coliform bacteria. Studies conducted as part of the TMDL indicate that dry season bacterial concentrations in the Union River are higher than those in the wet season, suggesting that there is a continuous, steady component to the pollution loading in the Union River. Since concentrations are relatively high during the wet season and flows are dramatically higher, there is also a storm-related component to the pollution loading. Pollution sources in the basin are exclusively non-point, and predominant sources are likely agriculture, onsite disposal (septic) systems, and post-development activities attributable to urban development (e.g., domesticated animals).

Shellfish

A portion of the Hood Canal #9 monitoring area is located adjacent to the City of Belfair (Figure 4-7), and the portion of this monitoring area impacted by Belfair is listed as prohibited for shellfish harvest. Pollution source identification and correction work is on-going in the area. Fifty-five acres of Belfair State Park tidelands were upgraded from Prohibited to Approved in 2006. However, extreme rainfall and storm water runoff resulted in emergency closures of the area from 1/30/2006 to 2/4/2006 and from 11/7/2006 to

11/14/2006. The area was closed from 8/2/2006 to 9/28/2006 due to a naturally occurring marine pathogen.

All stations in the "approved" portion of Hood Canal #9 meet the NSSP standard for an "approved" classification. The WDOH continues to assist Mason County in their pollution source identification work in the City of Belfair. Stimson and Little Mission Creeks and portions of the marine waters in Hood Canal #9 are currently on the 303(d) list for fecal coliform bacteria contamination.

Salmonid Habitat: Stream and Marine Nearshore

Stream Habitat: Salmonid habitat associated with Belfair UGA consists of nearshore habitat in the Hood Canal and stream habitat associated with Union River and its tributaries. Union River flows from Mason Lake into Case Inlet in the Puget Sound. The Washington Department of Fish and Wildlife identify Union River as a salmon-bearing stream, with several different species utilizing or potentially utilizing the in-stream habitat. Fall Chinook are documented as occurring in the Union River, and spawning habitat for Chinook exists in much of the system, with rearing habitat for the species occurring in the lower Union system. Spawning and rearing habitat for coho exist in the system, and summer and fall chum are documented as occurring in tributaries to the Union River. Spawning and rearing habitat for winter run steelhead occur in the Union River, and there is a documented presence of winter steelhead through much of the system. Pink salmon are also documented as occurring in the Union River system.

Nearshore Habitat: Similar to the nearshore habitat around Allyn, the nearshore habitat in the vicinity of the Belfair UGA has many of the same habitat features and functions. Saltwater marshes, tidal mudflats, and nearshore riparian habitat all occur in the Belfair area and all provide similar habitat functions and value to salmonids as noted above.

Suggestions for Resource Management

Management approaches that focus on preserving healthy ecological processes require a thoughtful and planned set of strategies to assess conditions, track changes, incorporate new information, and redirect efforts over time to keep the system in balance. Here are a few suggested activities from the literature to help protect and restore watersheds and sensitive habitat areas within the Puget Sound basin.

Stormwater Management / Watersheds

Booth et al. (2002) offered the following suggestions to minimize the impacts of stormwater:

- Cluster developments that protect half or more of the forest cover, preferentially in headwater areas and around streams and wetlands to maintain intact buffers,
- Allow a maximum of 20 percent total impervious area, and substantially less effective impervious area through widespread reinfiltration of stormwater,
- Provide onsite detention that is realistically designed to control flow durations (not just control peak flows),
- Protect riparian buffer and wetland protection zones to minimize road and utility crossings as well s overall clearing, and
- Do not allow any construction on steep or unstable slopes.

Habitat

The following is a summary from the Salmonid Habitat Limiting Factors Water Resource Inventory Areas 15 (West), Kitsap Basin and 14 (North), Kennedy-Goldsborough Basin http://salmon.scc.wa.gov/reports/wria14and15.pdf . Two sets of recommendations are presented for two different types of salmonid/fish habitat areas—freshwater Stream/riverine and saltwater marine nearshore.

Freshwater: Stream/Riverine

The Technical Advisory Group for WRIA 1 makes the following recommendations to protect existing habitat and minimize further degradation of riverine habitat conditions:

- Protect watershed conditions by preventing sprawling rural residential development. Encourage private forestland owners to continue timber production in a sustainable fashion that protects natural watershed functions (i.e. natural sediment production rates, natural runoff and stream flow regimes, mature riparian forests with coniferous trees, adequate large woody debris and pool abundance).
- Protect functional riparian forest buffers to provide shade to maintain cool summer stream temperatures, provide large woody debris necessary to maintain instream salmonid habitat, and filter soil and pollutants from runoff. Where feasible, replant native riparian vegetation at degraded sites.
- Protect functional floodplain habitat and where practical, restore lost floodplain habitat. Prevent further floodplain development. Decommissioning of an old forest road and construction of a new access road on the lower portion of Anderson Creek is one example of a potential floodplain restoration project.

- Protect the shorelines of lakes, ponds, and wetlands that maintain summer stream flows and provide rearing habitat for juvenile salmonids. Where practical, restore degraded shorelines.
- Maintain cool summer water temperatures and fish passage by preventing conversion of wetlands to shallow man-made lakes (for example Lake Symington and Lake Tahuya).
- Remove fish passage barriers.
- Minimize installation of impervious surfaces such as rooftops, roads, driveways, and lawns. Educate the public about the importance of minimizing impervious surfaces.
- Monitor instream flows and water quality parameters including temperature and dissolved oxygen levels throughout west WRIA 15 and north WRIA 14.
- Assess salmonid habitat conditions in the watersheds of the numerous small independent streams in the report area, particularly streams in the Port Gamble Subbasin and streams draining to the north shore (Tahuya-Dewatto and Union-Mission Subbasins) and south shore (North WRIA 14) of the east arm of Hood Canal.

Marine: Nearshore Habitats

The following recommendations are provided to address similar habitat concerns associated with marine nearshore habitat areas:

- Evaluate all road crossings along the Hood Canal shoreline to assess tidal function, sediment transport, and anadromous fish migration, and where necessary, implement corrective actions to restore and/or enhance natural tidal processes, sediment transport, and anadromous fish access.
- Allow eroding bluffs to function naturally to provide the sediment and large woody debris needed to maintain shoreline features such as beaches, spits, and lagoons, and shoreline habitat complexity.
- Where practical, remove intertidal fill to restore/improve natural tidal and sediment transport processes.
- Where practical, remove shoreline armoring or replace armor with alternatives including large woody debris and riparian plantings.
- Prevent installation of intertidal fill and shoreline armoring, prevent removal of native riparian vegetation, and encourage landowners to install community boat ramps, docks, and piers rather than installing structures at each individual property.
- Reduce impervious surfaces and impervious surfaces to reduce the impacts of high winter infiltration of precipitation.

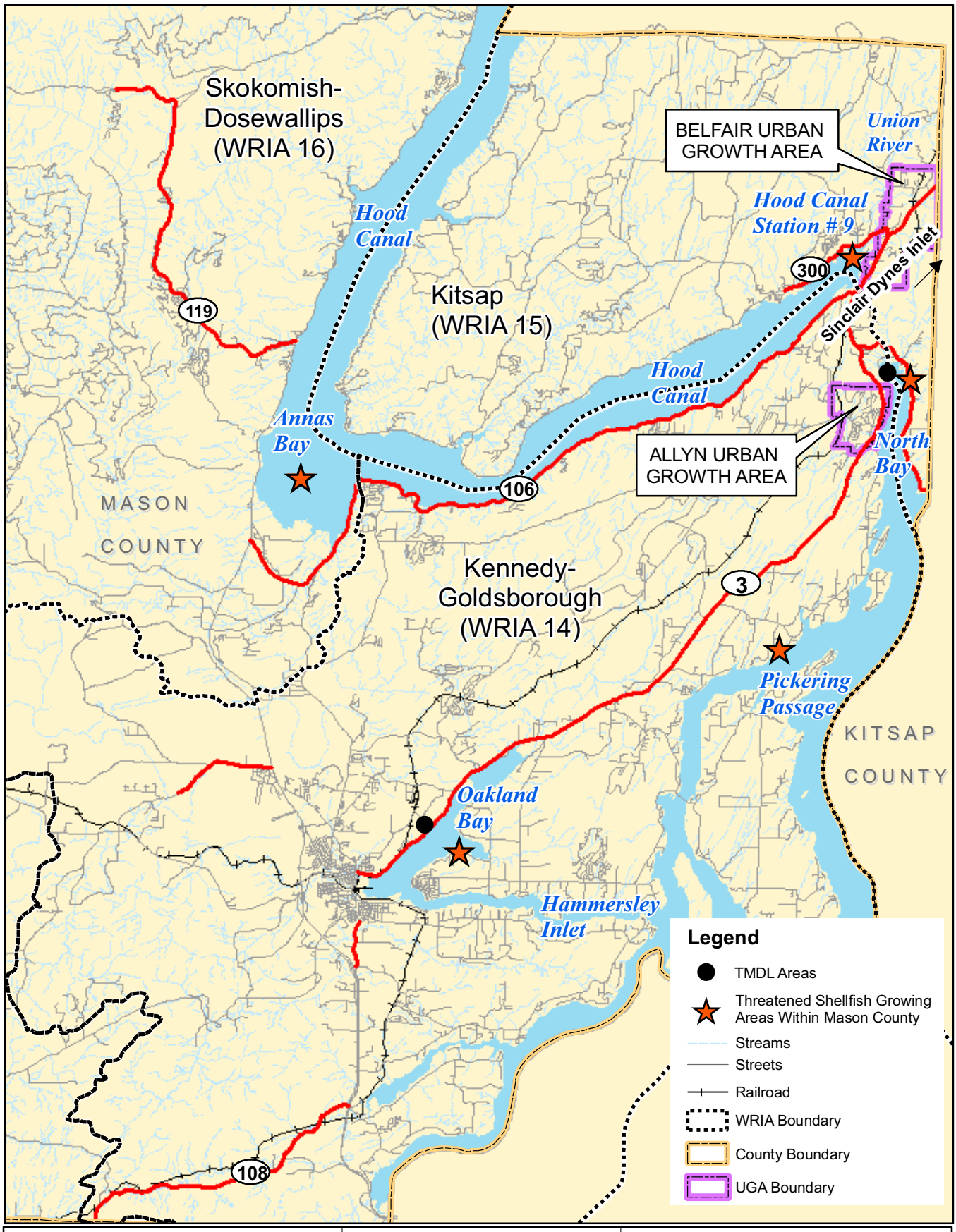

Figure 4-1
Mason County Wria Map

N
W E
S

0 2 4 Miles

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Shelton, Washington 98584
Phone: (360) 427-9670
Fax: (360) 427-8425

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Kirkland, Washington 98033
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Fax: (425) 827-9577

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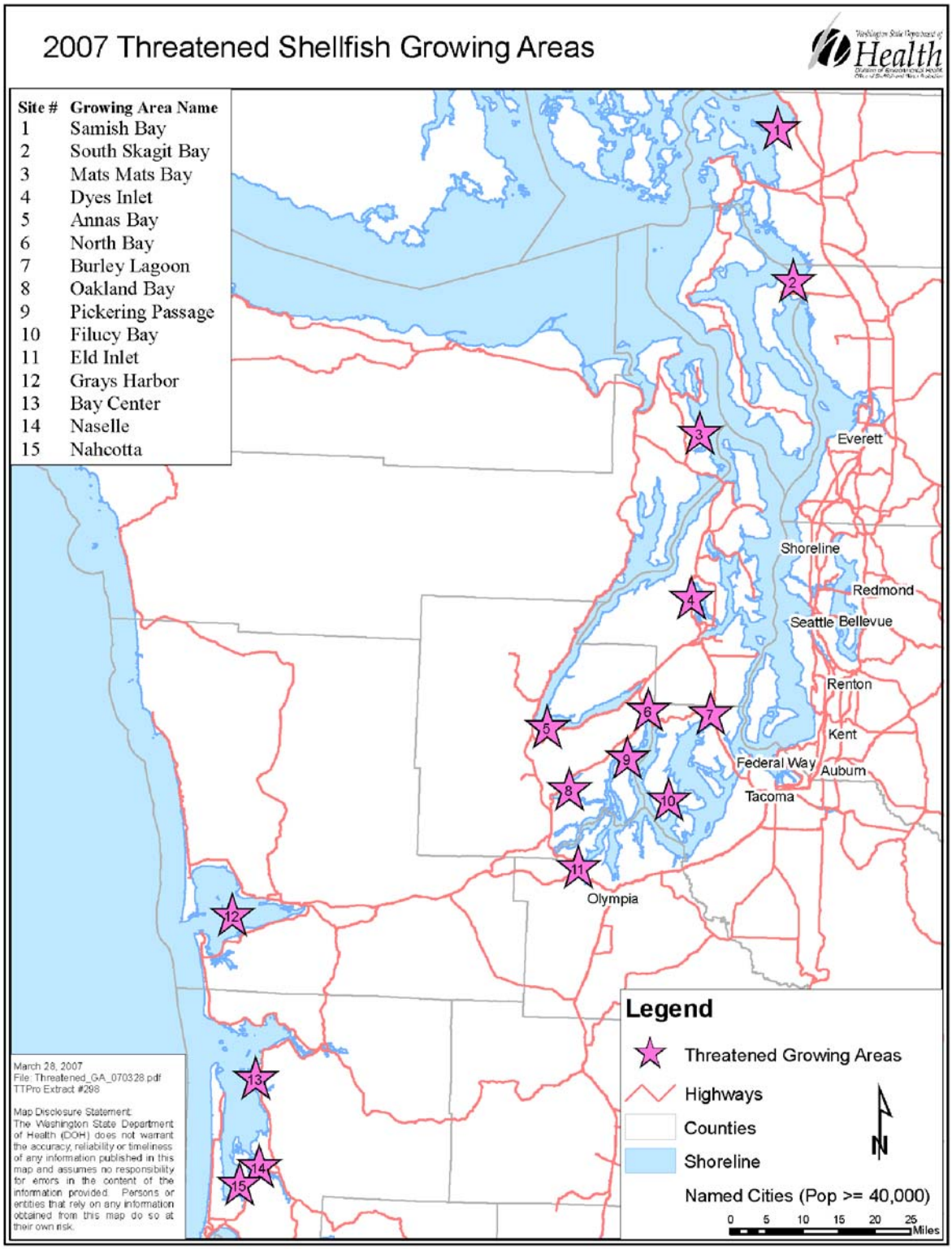

Figure 4-2
2007 Threatened Shellfish Areas

0 1,500 3,000
Feet

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Fax: (360) 427-8425

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Fax: (425) 827-9577

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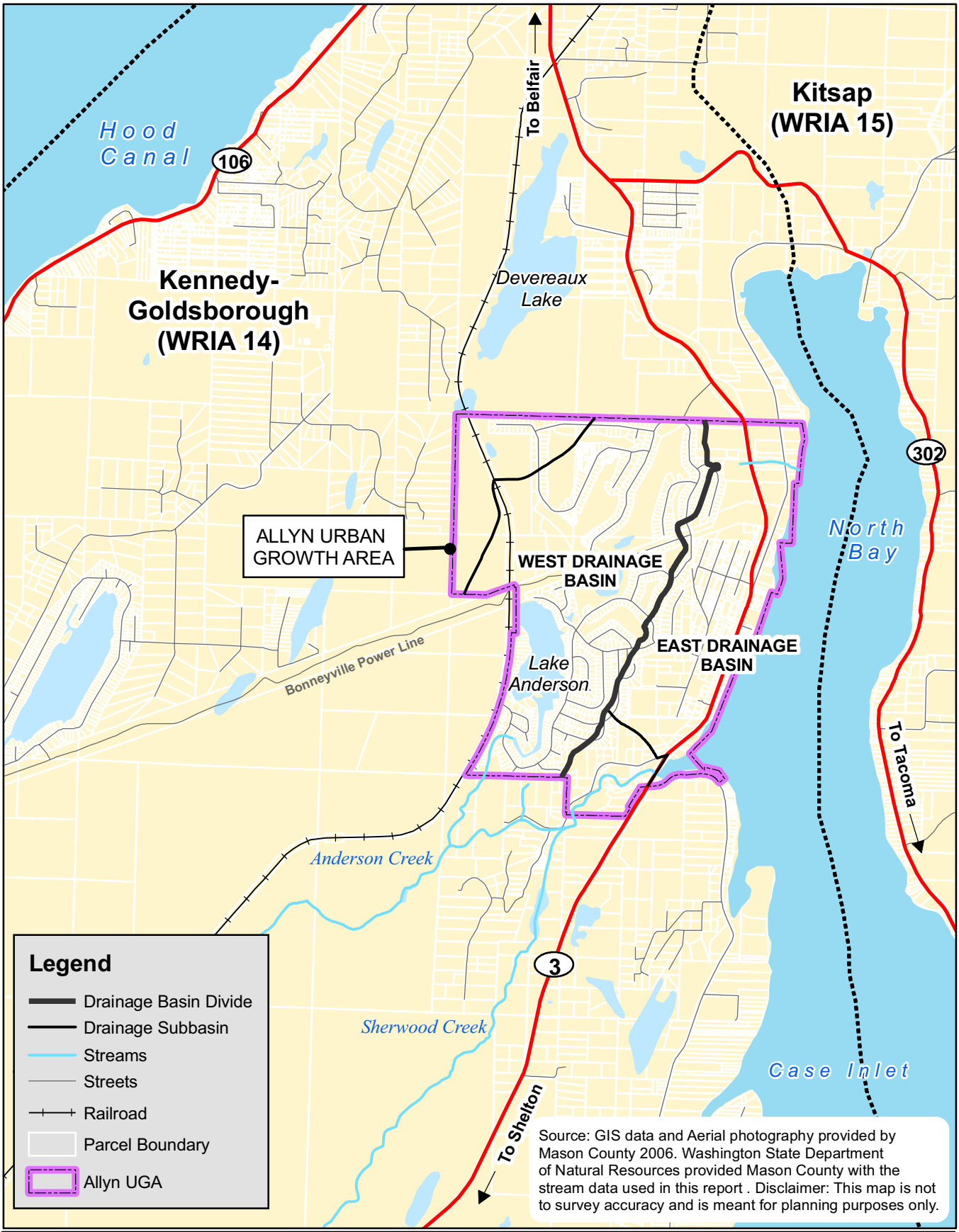

Figure 4-3
Allyn Surface Drainages

0 1,500 3,000 Feet

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Fax: (360) 427-8425

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Kirkland, Washington 98033
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Fax: (425) 827-9577

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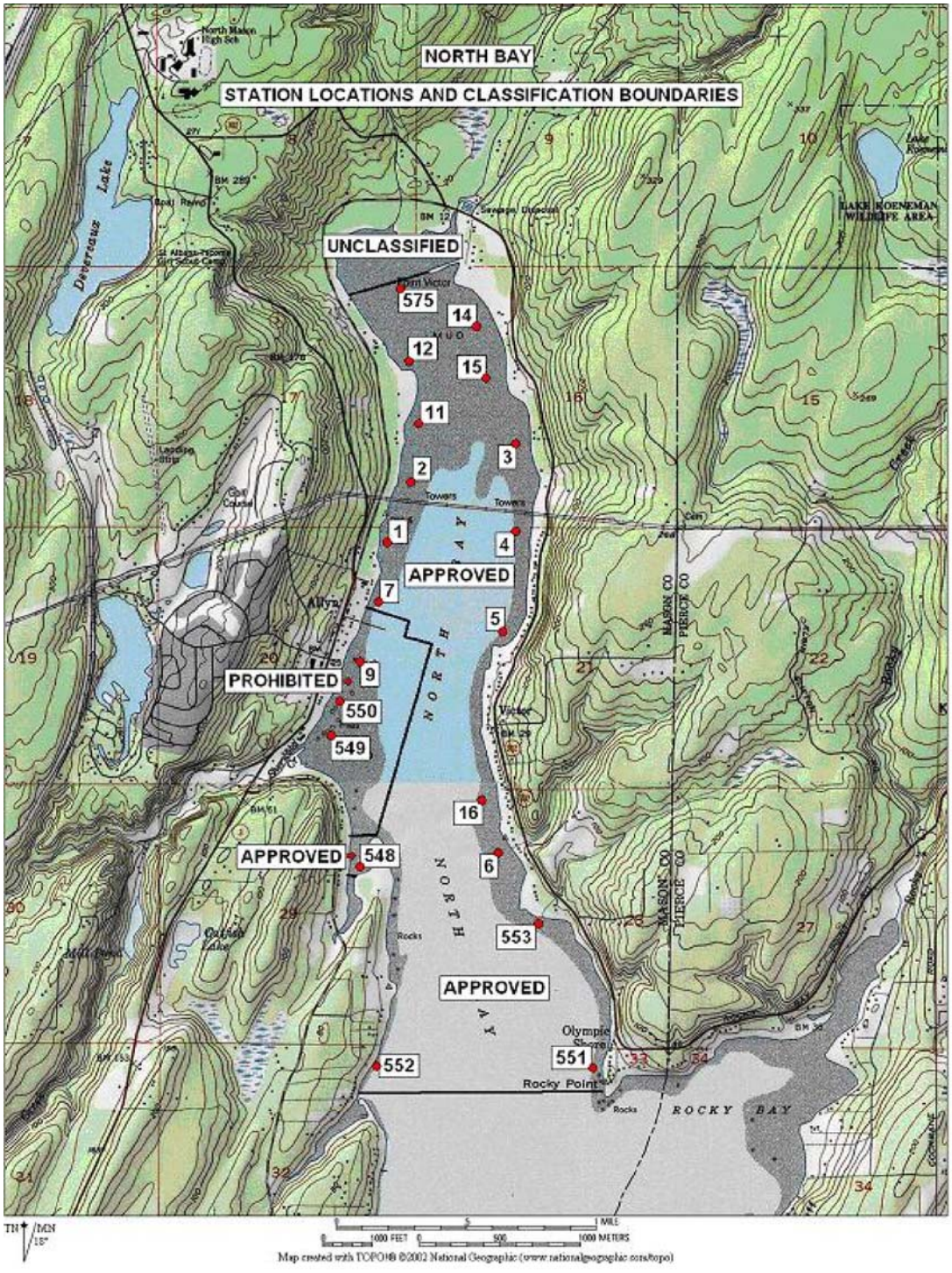

Figure 4-4
North Bay Shellfish Sampling Areas

N

0 1,500 3,000
Feet

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Phone: (360) 427-9670
Fax: (360) 427-8425

10230 NE Points Drive, Suite 400
Kirkland, Washington 98033
Phone: (425) 822-4446
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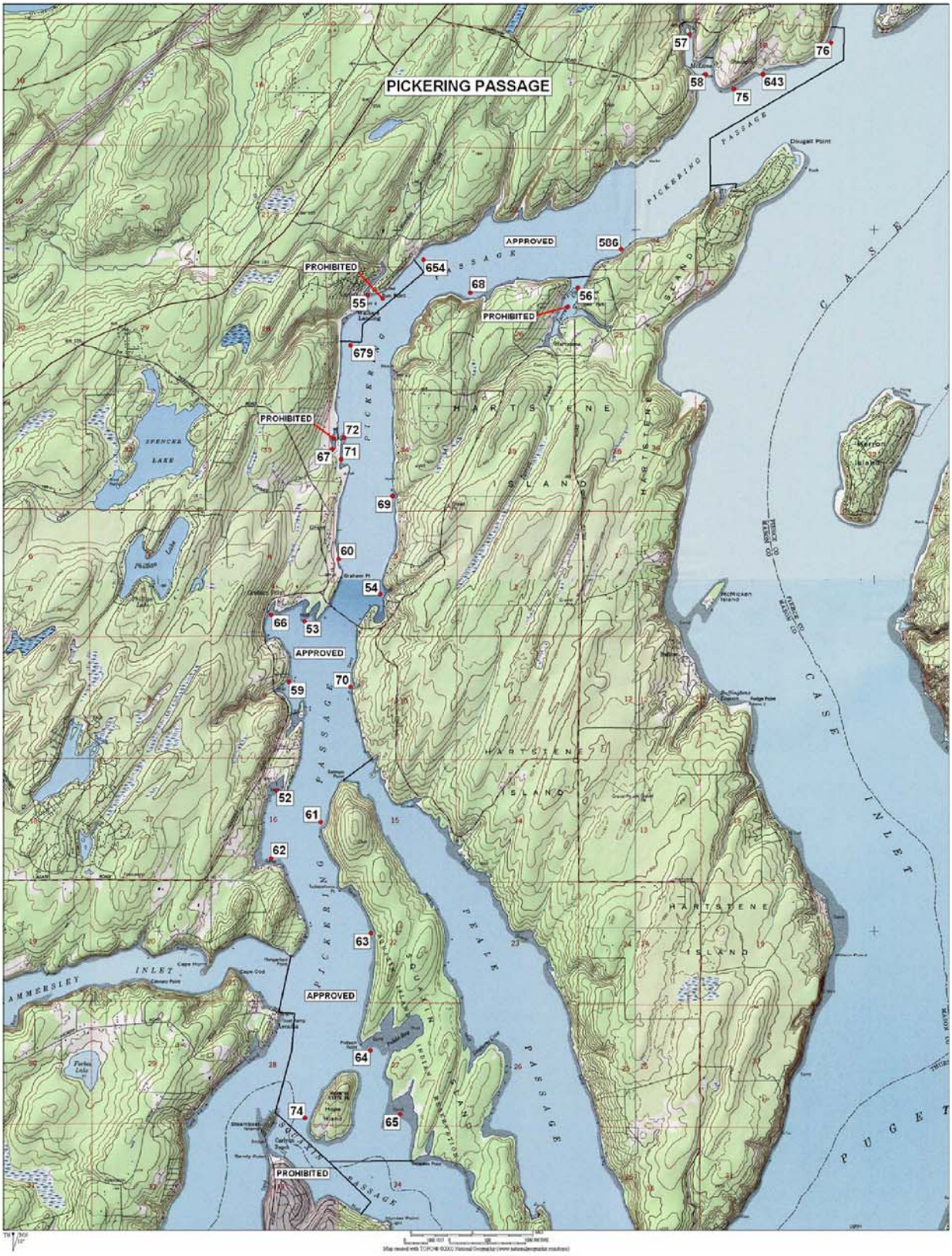

Figure 4-5
Pickering Passage Shellfish Sampling Areas

0 1,500 3,000 Feet

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Kirkland, Washington 98033
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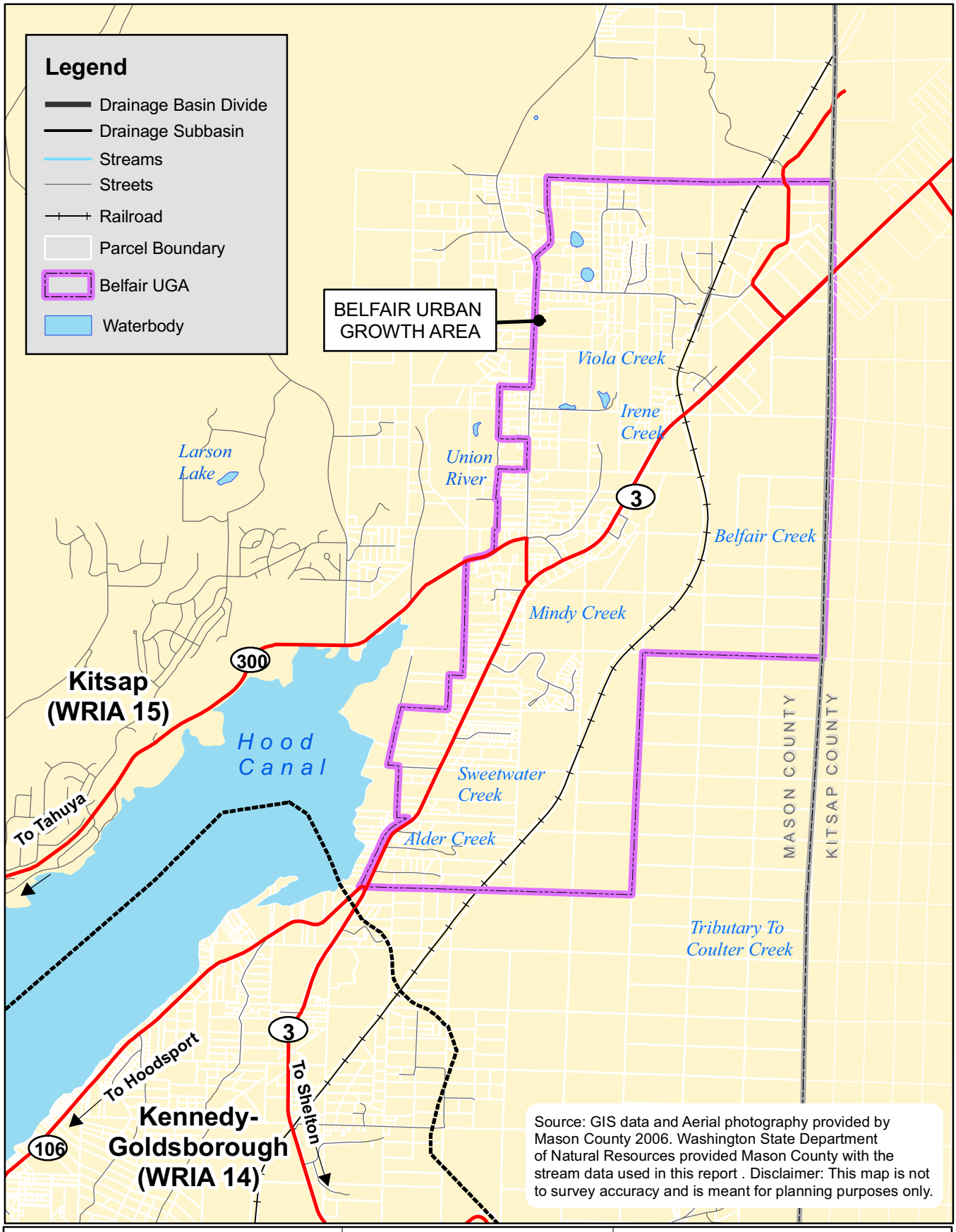

Figure 4-6
Belfair Surface Drainages

N

0 1,500 3,000 Feet

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Fax: (360) 427-8425

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Kirkland, Washington 98033
Phone: (425) 822-4446
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K:/project/30700/30784/GIS/mxds/Addendum/Figure4_6.mxd

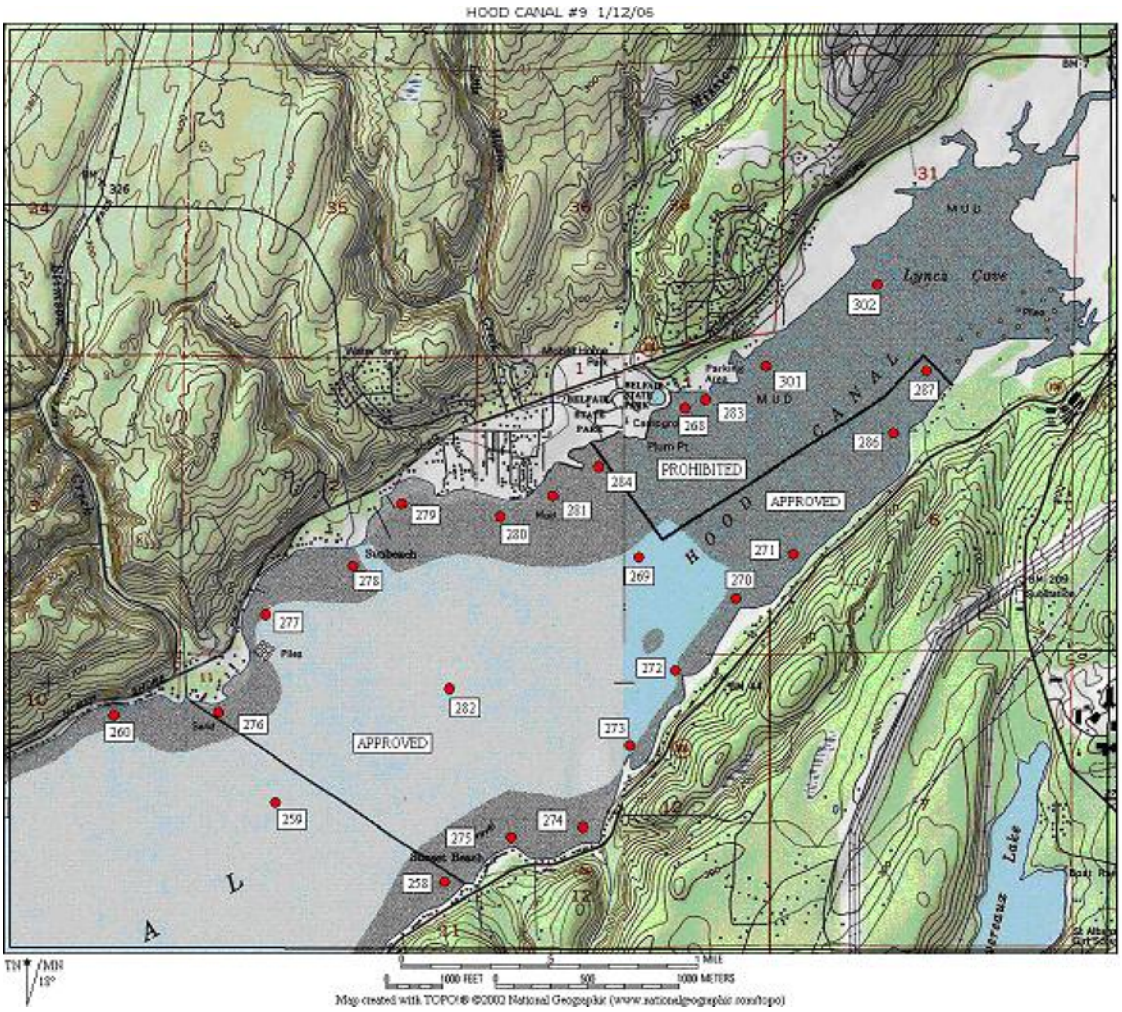

Figure 4-7
Hood Canal Station #9
Shellfish Sampling Areas

0 1,500 3,000
Feet

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K:/project/30700/30784/GIS/mxds/Addendum/Figure4_7.mxd