

COMPREHENSIVE PLAN

SAN JUAN COUNTY

APPENDIX 10

**EASTSOUND STORM DRAINAGE FACILITIES
ORDINANCE 33-2008**

Adopted July 29, 2008

**AN ORDINANCE AMENDING THE SAN JUAN COUNTY COMPREHENSIVE PLAN
TO ADD A NEW APPENDIX TO THE COMPREHENSIVE PLAN TO ADDRESS
STORM DRAINAGE FACILITIES IN EASTSOUND INCLUDING CAPITAL
FACILITIES AND FINANCING OF PLANNED DEVELOPMENTS**

BACKGROUND

A. On October 25, 2005, Ordinance 13-2005 was adopted to amend the San Juan County Comprehensive Plan and portions of the Eastsound Subarea Plan (SJCC Chapter 16.55) with the purpose of bringing San Juan County into compliance with an order of the Western Washington Growth Management Hearings Board (Growth Board) regarding the Eastsound Urban Growth Area ("Eastsound UGA").

B. On November 8, 2005, Ordinance 14-2005 was adopted to form a County Storm Water Utility pursuant to RCW 36.89 *et seq.*

C. On June 20, 2006, the Growth Board ruled in its Compliance Order/Final Decision and Order ("Order") that the Eastsound UGA does not comply with the Growth Management Act.

D. The Growth Board's June 20, 2006, Order states that the capital facilities element of the Comprehensive Plan "fails to include a 6-year financing plan for its storm drainage facilities for the Eastsound UGA" and fails to "demonstrate that urban levels of service are planned for the entire UGA during the 20-year planning period."

E. On December 12, 2006, Ordinance 20-2006 was adopted to provide a fee which would finance storm drainage capital facilities.

F. Ordinance 20-2006 was referred to the voters in Referendum 2007-1 and then not approved by the voters at the November 2007 election.

G. In May 2005 a Long Range Drainage Plan for Eastsound Village Urban Growth Area was prepared by Gerald Rasmussen, P.E. ("Rasmussen Plan"), which includes basin analyses, an inventory of existing capital facilities, a forecast of future needs, the proposed locations and capacities of expanded and new facilities, and a 6-year capital improvement plan.

H. The Rasmussen Plan has not previously been adopted as part of, or incorporated by reference, into the Comprehensive Plan.

I. In 2008 the San Juan County Department of Public Works prepared an updated 6-year project list for storm drainage capital facilities in the Eastsound UGA along with a list of storm drainage capital facilities projects to occur in the Eastsound UGA during the 20-year planning period.

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J. On May 20, 2008, Ordinance 27-2008, an ordinance providing for an interfund loan for storm water facilities in Eastsound, was adopted to provide the necessary funding for the 6-year project list of capital facilities in the Eastsound UGA.

K. The County desires to comply with the Growth Board's Order and amend the Comprehensive Plan to make adequate provision for storm drainage facilities in the Eastsound UGA to take all steps necessary to bring the Eastsound UGA into compliance with the Growth Management Act.

L. The required 60-day notice for adoption of this ordinance was delivered to the Washington State Dept. of Community, Trade and Economic Development on April 23, 2008.

M. A draft of this ordinance was considered by the San Juan County Planning Commission at a properly noticed public hearing held on May 19, 2008.

N. After considering the evidence in the record, the Planning Commission recommends, "with profound reservations," the adoption of a new Appendix 10 to the San Juan County Comprehensive Plan titled "Long Range Drainage Plan for Eastsound Village Urban Growth Area" and associated updated 6- and 20-year Capital Improvement Plans.

O. After considering the evidence in the record, the Planning Commission further recommends the following:

1. That projects in the Long Range Drainage Plan for Eastsound Urban Growth Area and associated updated 6- and 20-year Capital Improvement Plans be undertaken only with basin-wide analysis and recommendations based on science-based stormwater management programs and low impact development as discussed on pages 9 and 10 of the plan.

2. That Eastsound Stormwater Capital Improvement projects secure sufficient easements for non-motorized trails regardless of current funding availability.

3. That page 10 of the Rasmussen Plan at the 5th bullet point of the Science Based Stormwater Management Programs section be modified to read: "Introduce new concepts, technologies, and objectives for stormwater management such as multifunctional landscape features that mimic or replicate hydrologic functions and maintain the ecological/biological integrity of receiving streams and encourage critical aquifer recharge."

P. Changes to the text of the Rasmussen Plan have been made as recommended by the Planning Commission.

Q. This ordinance was considered by the County Council during a properly noticed public hearing held on July 29, 2008, at which time the public had the opportunity to comment.

R. After considering the evidence in the record, the County Council decided to approve this ordinance.

NOW, THEREFORE, BE IT ORDAINED by the County Council of San Juan County, Washington, as follows:

Section 1. Findings. The Council adopts the findings of the Planning Commission as follows:

- A. The Long Range Drainage Plan for Eastsound UGA contains an inventory and analysis of existing public facilities and services.
- B. The Long Range Drainage Plan for Eastsound UGA contains a forecast of future needs as well as the proposed locations and capacities for expanded or new capital facilities and problem specific projects.
- C. The updated 6 year capital improvement plan details both costs and projects that are expected to be constructed within the next 6 years.
- D. The updated 20 year capital improvement plan details costs and projects that are expected to be constructed over the planning horizon.
- E. The Long Range Drainage Plan for Eastsound Village UGA has been reviewed by the Eastsound Plan Review Committee over the past three years and public comment has been strongly in support of Low Impact Development and Best Available Science, in contrast with the traditional pipe and transport conveyance currently in section D of the Plan.

Section 2. Amendment to the Comprehensive Plan to Add a New Appendix 10.

The San Juan County Comprehensive Plan shall be amended to add a new Appendix 10 to read as follows:

APPENDIX 10

Eastsound Storm Drainage Facilities Capital Facilities and Financing Planning

To address storm drainage requirements in the Eastsound Urban Growth Area, in 2005 the County prepared a report entitled the Long Range Drainage Plan for Eastsound Village Urban Growth Area. The report was written by Gerald P. Rasmussen and dated May 2005 (the Rasmussen Plan, copy attached as Exhibit A). The Rasmussen Plan includes a basin analysis, an inventory of existing facilities, a forecast of future needs, the proposed locations and capacities of expanded and new facilities, and a 6-year capital improvement plan. The Rasmussen Plan is approved and adopted, except as such plan is modified as set forth below. The Rasmussen Plan as modified is intended to satisfy the storm drainage capital facilities requirements of RCW 36.70A.070(3)(a)-(d) and show how storm drainage facilities will be provided during the 20-year planning period, thereby meeting the requirements of RCW 36.70A.110(3) and RCW 36.70A.020(12).

In April 2008 the County engineer prepared an updated 6-year capital improvement plan for storm drainage facilities, a copy of which is attached as Exhibit B. The 2008 Six Year Stormwater Capital Improvement Plan set out in Exhibit B is approved and adopted.

In April 2008 the County engineer also prepared an updated 20-year capital improvement plan for storm drainage facilities, a copy of which is attached as Exhibit C. The 2008 Twenty Year Stormwater Capital Improvement Plan set out in Exhibit C is approved and adopted.

In May 2008 the County Council approved Ordinance 27-2008 to provide funding for the 6-year capital improvement plan for stormwater in Eastsound. That ordinance was adopted to comply with the requirements of RCW 36.70A.070(3)(d).

Section 3. Amendment to Table of Contents.

The Table of Contents of the Comprehensive Plan shall be amended to show the establishment of Appendix 10.

Section 4. Effective Date.

This ordinance shall take effect on the tenth working day after adoption.

Section 5. Codification.

This ordinance shall not be codified, but a copy shall be placed with the official version of the San Juan County Comprehensive Plan as maintained by the Community Development and Planning Department.

ADOPTED this 19th day of July 2008.

**COUNTY COUNCIL
SAN JUAN COUNTY, WASHINGTON**

ATTEST: Clerk of the Council

Howard Rosenfeld
Howard Rosenfeld, Chair
District 3, Friday Harbor

By: Ann Larson
Ann Larson - Clerk
Date: 7/29/2008

Gene Knapp
Gene Knapp, Vice-Chair
District 5, Orcas East

REVIEWED BY COUNTY
ADMINISTRATOR

Pete Rose
Pete Rose
Date: 7-22-08

Kevin M. M. Ranker
Kevin M. M. Ranker, Member
District 1, San Juan South

APPROVED AS TO FORM ONLY
RANDALL K. GAYLORD

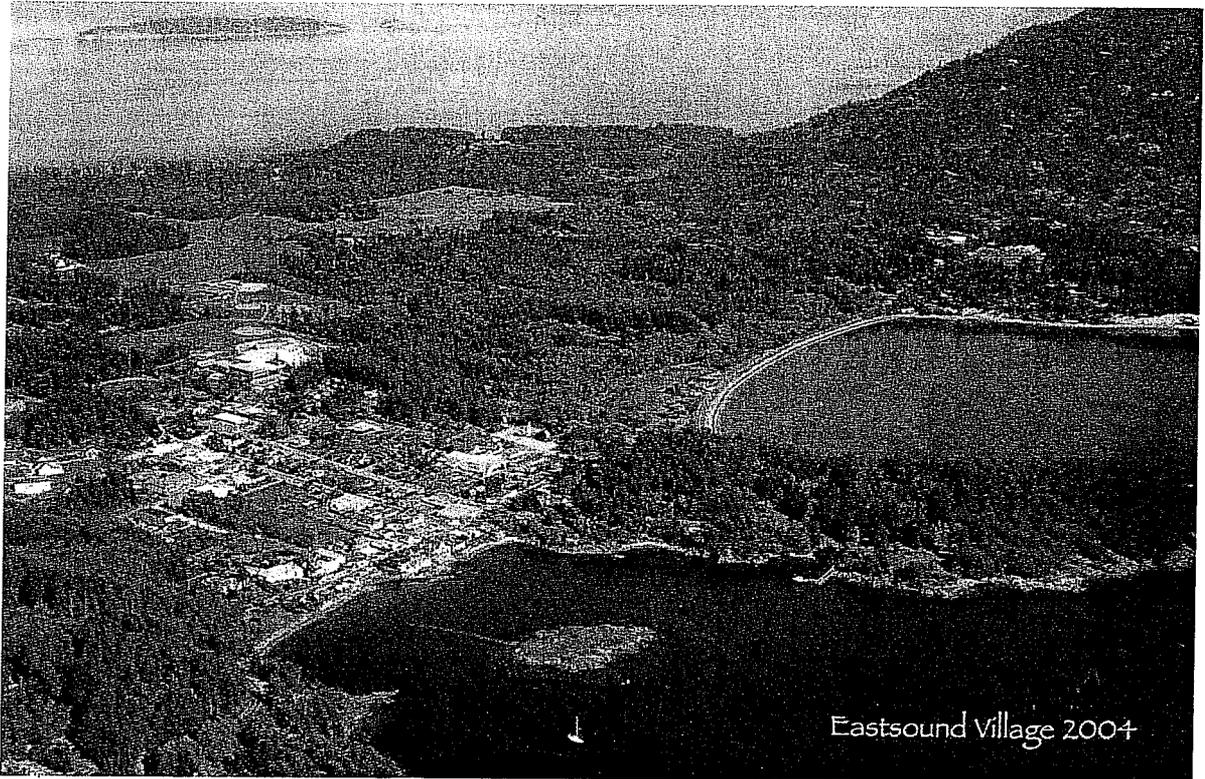
Richard Peterson
Rich Peterson, Member
District 2, San Juan North

By: [Signature]
Date: 7/16/08

Alan Lichter
Alan Lichter, Member
District 4, Orcas West/Waldron

Bob Myhr
Bob Myhr, Member
District 6, Lopez/Shaw

**LONG RANGE DRAINAGE PLAN PROPOSAL
FOR
EASTSOUND VILLAGE URBAN GROWTH AREA**



REPORT SUMMARY

This report has three goals. The first is to provide a basis for a Comprehensive Stormwater Management Plan for the Eastsound Urban Growth Area (Eastsound UGA). The second goal is to provide an interim plan to guide the orderly development and management of stormwater drainage within the Eastsound UGA, the third is to make available data and information that combined with a supplementary implementation and finance report will meet Growth Management Act (GMA) requirements for stormwater planning in the Eastsound UGA.

Stormwater management is a private as well as a public issue. It has both public and private impacts as well as public and private costs. Stormwater issues that are not taken care of on-site frequently become public problems where the public sector ends up paying to mitigate the impacts created by private development. However, in many situations it is difficult, inefficient and/or impractical to solve stormwater issues on-site and better solutions are available by approaching the problem from a collective or regional perspective.

This report attempts to strike a balance between privately funded and managed on-site solutions and publicly funded and managed stormwater projects such as larger shared culverts and storm drains and regional stormwater detention and water quality treatment facilities. The reality is that a combination of both strategies is needed to achieve the most cost-effective stormwater management system within a watershed.

The fundamental objective of this stormwater management plan is to specify changes to the land use practices in the development of Eastsound that will maintain the quality, quantity, and rate of runoff as close to the predevelopment condition as possible. Stormwater management strategies proposed to meet this objective include preventing runoff at the source by minimizing the amount of impervious surfaces, providing areas that detain water and slow its progress toward the streams and wetlands, amending soils to absorb more water, providing areas with vegetation to filter water as it moves across the land, and practicing good day-to-day housekeeping on construction sites to prevent sediment and other pollutants from washing into East Sound and the Eastsound area wetlands.

This report recommends that the threshold to trigger runoff treatment requirements be made more stringent in those basins draining to East Sound. The reason is to protect the biodiversity of East Sound, which is the highest priority marine resource at risk from watershed development. East Sound is particularly vulnerable to stress from pollutants due to the poor circulation and low volume exchange in the vicinity of Eastsound. A water quality goal of 90% capture (i.e., removal) of pollutants is recommended for stormwater discharge to East Sound.



Main Street, Eastsound, looking west toward Double Hill

**LONG RANGE DRAINAGE PLAN PROPOSAL
FOR THE
EASTSOUND URBAN GROWTH AREA**

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LONG RANGE DRAINAGE PLAN PROPOSAL FOR THE EASTSOUND URBAN GROWTH AREA

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A. INTRODUCTION

1. GOAL AND OBJECTIVES

This report has three goals. The first is to provide a basis for a Comprehensive Stormwater Management Plan for the Eastsound Urban Growth Area (Eastsound UGA). The second goal is to provide an interim plan to guide the orderly development and management of stormwater drainage within the Eastsound UGA, the third is to make available data and information needed to meet Growth Management Act (GMA) requirements related to stormwater planning for the Eastsound UGA. In brief, this report includes the following:

1. Basis for a Comprehensive Stormwater Plan
2. Preliminary Plan for Development of Needed Stormwater Controls
3. Satisfy, in part, GMA requirements related to Stormwater Planning

This report does not provide all of the information required by the GMA. The implementation and finance portions of the GMA requirements are provided in a supplemental document.

First Goal

The following listed elements will serve as integral components for a future Comprehensive Stormwater Management Plan for the Eastsound UGA. These elements are:

- Identification of the requirements needed to manage stormwater quality and quantity impacts, in order to protect natural systems and receiving waters from degradation as a result of development.
- Descriptions of a proposed mix of projects and strategies that will meet the above requirements.
- An estimate of the costs to design and construct the various projects and implement the strategies proposed, and
- An estimate of the appropriate timing to initiate each project and strategy in order to accommodate anticipated future development.

Second Goal

This report first sets forth actions and a list of projects consistent with current county regulations and policies needed to accommodate the growth and development being planned for the Eastsound UGA. The report then goes a step further and proposes changes and supplements to current regulations and policies, designed to better achieve the goals and objectives stated above.

The recommendations for changes in current regulations and policies are made to encompass a broader, more comprehensive view of stormwater management than the approach taken by traditional Stormwater Management Programs. This report includes natural resource protection as an integral element of the Stormwater Management Programs. Traditional Stormwater Management Programs tend to focus on structural controls located within the municipally controlled stormwater systems (e.g., catch basins, gutters, culverts, detention facilities, etc.) This report takes into consideration stormwater management alternatives such as Low Impact Development programs to reduce the costs associated with stormwater management while providing technical assistance, education and incentives to encourage best stormwater management practices by property owners, property and easement acquisitions that benefit stormwater management, and projects to improve water quality, enhance natural resource sites and protect aquatic resources. Further rationale and justification for this approach is presented in Section C, Recommended Programs.

Third Goal

Five elements must be completed to satisfy the Growth Management Act requirements for stormwater management:

1. An inventory of existing facilities
2. A forecast of needs
3. A facilities plan for future development
4. A financing plan, and
5. A legislative action that requires review and revision of the Stormwater Plan if implementation of the plan fails to meet needs

This report will fulfill the first three requirements listed above.

2. STUDY AREA

Figures 1 and 2 show, respectively, the boundaries and land use of the Eastsound Urban Growth Area (Eastsound UGA) and the ten drainage basins associated with the Eastsound UGA. The Eastsound UGA is located on a 1-1/4 mile-wide isthmus located at the north end of the arch-like Orcas Island landform. The isthmus is bordered landward by hills to the east and west. The area generally located north of Mt. Baker Road drains northward toward President Channel and the area generally located to the south of Mt. Baker Road drains southward to East Sound.

The Village commercial area is shown in Figure 1. It is served by a stormwater system of curbs, gutters, catch basins, and culverts (see Figure 6). The Eastsound Airport located in the northwest quadrant of the Eastsound UGA has a rudimentary catch basin and culvert drainage system (see Figure 11). The remainder of the

Eastsound UGA depends upon road-side ditches for stormwater catchment, treatment and conveyance.

The Eastsound Swale located between Lover's Lane and North Beach Road, just west of the Village commercial core, is a significant drainage feature in the Eastsound UGA. The Eastsound Swale is a regulated wetland in San Juan County, mandating that discharges to the wetland from future development within its watershed be tightly regulated.

3. AUTHORITY AND RESPONSIBILITY

The Eastsound UGA is currently unincorporated and the jurisdiction for drainage and surface water (hereafter referred to as stormwater) management inside this area is held by San Juan County. The Department of Community Development and Planning (CD&P) has authority to regulate the installation of drainage facilities as part of the review and permit process for new land development within the county. The Public Works Department provides technical review and comment to the CD&P on stormwater related issues.

San Juan County has adopted Department of Ecology's Stormwater Management Manual for Western Washington, 2001 edition as the guidance manual for stormwater management in the county. The Stormwater Management Manual (2001) delegates responsibility for flow control requirements to the local jurisdiction. San Juan County has designated September 1991 as the pre-development condition to be used in estimating stormwater runoff impact. Any development in the county must control off-site runoff to replicate runoff conditions as of the pre-development date or compensate, at a premium, for the impact, generally by restoring or enhancing a damaged natural system.

The San Juan County Public Works Department has been assigned responsibility for overseeing stormwater issues in the county and in addition, to following the direction of Stormwater Management Manual, 2001, has established a policy of implementing the flow control standards by following the procedures set forth in the 1998 edition of the King County Storm Water Design Manual.

The King County Storm Water Design Manual 1998 has three levels of flow control performance standards each based on land use and extent of impervious area (see King County Storm Water Design Manual, Section 1.2.3 and Table 1.2.3.A.).

King County is currently revising the King County Storm Water Design Manual, 1998. Draft revisions of the flow control standards are currently available. The revision gives instructions on selecting appropriate flow control Best Management Practices and also allows credit to be given to owners that implement on-site source controls. The San Juan County Public Works Department plans to adopt the new flow control revisions.

4. FUTURE EASTSOUND UGA ORGANIZATIONAL NEEDS

Stormwater needs are just one part of the overall county infrastructure, which includes roads, roadside drainage, docks, boat ramps, bridges, buildings and real estate, equipment, materials, and continuing maintenance for all these areas. Currently, Eastsound competes with all the other county-wide needs for limited resources and funding for stormwater infrastructure improvements.

The following organizational concepts should be considered given the magnitude of the future infrastructure needs and current issues involving sewer and water infrastructure within the Eastsound UGA:

- Incorporate and manage all infrastructure needs, including utilities.
- Form a Local Utility District and manage all utilities.
- Form a drainage district.
- Form a sewer/water district.

The Eastsound UGA can improve efficiency and delivery of services by assuming responsibility for planning, organizing, and managing its future needs through a single organization, whose sole function is concerned only with the Eastsound UGA infrastructure needs.

5. PREVIOUS STUDIES

County records contain the below listed reports that are relevant to stormwater management in the Eastsound UGA. The Airport Drainage Basin Study, in particular, contains current data to support the recommendations made in this report for Basin 5.

Storm Drain Plan for the Eastsound Village. Steve Braun, 1983 (Incomplete Report)

This study laid out a plan to guide the future installation of storm drains in the Eastsound Village area. The study modeled future stormwater flows and recommended the location and size of future stormwater facilities.

A Study of Stormwater in Eastsound, Washington. Hart Pacific Engineering, 1988

This study is an overview of stormwater conditions in Eastsound. The study recommends an integrated approach to stormwater management, an approach that encourages controls that preserve and mimic natural systems.

San Juan County Watershed Management Action Plan. 2000

This plan, prepared jointly by a citizens committee and County staff and adopted by the Board of County Commissioners (BOCC) in June 2000, evaluated the impact of non-point sources of pollution in major county watersheds. The report recommended formation of a utility district that would administer a water quality monitoring program and assure maintenance of on-site waste disposal systems.

This study presents findings from a water quality monitoring study that reported the levels of fecal coliform, total suspended solids and temperature exceed State water quality standards in Fishing Bay, the receiving water of stormwater runoff from Eastsound Village.

Mount Property Stormwater Control Study, Hart Pacific Engineering, 1999

This study investigated the feasibility of constructing a stormwater treatment facility to treat runoff generated within the northwestern portion of the Eastsound Village core area. The treatment facility was to be located on the County owned parcel located immediately south of the Seaview Theater property.

Eastsound Watershed Evaluation, Hart Pacific Engineering, 1999

This study estimated the potential stormwater discharge at the outlet of the Eastsound Swale under fully developed conditions assuming the swale could be used for stormwater conveyance. It has since been determined that a large portion of the upper basin used in the runoff model does not contribute flow to the swale.

Airport Drainage Basin Study, Hart Pacific Engineering, 2003

This report presents an evaluation of stormwater runoff within the Eastsound Airport Drainage Basin. The study, commissioned by the Port of Orcas, determined that the existing outfalls serving this basin do not have adequate capacity to accommodate expected surface water flows from future development.

B. EVALUATION METHODS

The Santa Barbara Unit Hydrograph was used to estimate the peak rates of storm runoff for the fully developed condition within each drainage basin in the study area using regional precipitation data. The estimated runoff for existing conditions was not calculated.

Modeling was based on full development because it is possible that any particular sub-basin within the Eastsound UGA is likely to achieve build-out condition during the anticipated life of any new, engineered conveyance facilities (i.e. 50 years). Land use development levels under fully developed conditions were derived from the Eastsound Subarea Plan (September 9, 2003) and from the San Juan County Comprehensive Land Use Plan and Shoreline Master Program District 2 Land Use Map (January, 2003).

The build-out scenario assumes that the residential densities allowed in the current County Comprehensive Plan are adhered to and that all lots in the drainage basins are fully developed. For example, where residential density of 4 dwelling units per acre (DU/Ac) is allowed, the area was modeled as if the entire area were developed at 4 DU/Ac. However, in areas where a range of densities is allowed the lower value was always chosen. This assumption was made based on historical building patterns within Eastsound and serves to temper the conservative assumption that all lots are fully developed.

The model assumes uncontrolled conveyance of all stormwater flow. Low Impact Development, Best Management Practices and other runoff control strategies such as detention ponds were not considered in the build-out model. Thus, the peak rates of runoff are conservatively high. In reality, on-site and regional runoff control facilities will be required for plats, and at locations where full conveyance is damaging to aquatic resources, not cost effective or physically not feasible.

Standard textbook Natural Resources Conservation Service runoff curve numbers were used in the model for commercial land use and residential land use with a density greater than 8 DU/Ac. Rural residential land use is based on a rural lot with 5% impervious surface, 45% forested, 30% pasture, and 20% lawn and landscaping (see appendix for a typical 10 acre rural lot layout).

Peak run-off rates (uncontrolled) for the build-out scenario were calculated for the 6-month, 25-yr and 100-yr/24 hr. storm events using the Santa Barbara Unit Hydrograph model. The time of concentration values were estimated using the USDA Soil Conservation Service's Technical Release 55 Urban Hydrology Program. The detailed land use and runoff assumptions used for each basin are given in the Appendix.

Note that the runoff calculations and discharge flow predictions used in this report are intended for overall planning and evaluation purposes only. They are based on the generalized land use and land condition assumptions noted above and these may not be appropriate for specific facilities design. More detailed hydrologic analysis should be undertaken prior to the design of specific on-site or off-site storm water control and/or treatment facilities.

San Juan County maintains a wetland inventory database created in 1990 that provided the locations of known wetlands. This data was supplemented by specific delineations of wetlands from properties within the Eastsound UGA that had recorded wetland surveys in the public record. In addition, Geographic Information System (GIS) layers and a 2003 aerial photo of the Eastsound UGA were analyzed to locate areas where wetlands appeared probable based on topography, basin area, observed surface ponding and vegetation characteristics. The findings were compared to conditions observed during a roadside survey of known and suspected wetlands in the Eastsound UGA to verify the presence of wetlands.

C. RECOMMENDED PROGRAMS

1. INTRODUCTION

Stormwater management is a private as well as a public issue. It has both public and private impacts as well as public and private costs. Stormwater issues that are not taken care of on-site frequently become public problems where the public sector ends up paying to mitigate the impacts created by private development. In many situations it is difficult, inefficient and/or impractical to solve stormwater issues on-site. More and better solutions are available by approaching the problem from a collective or regional perspective. .

This report attempts to strike a balance between requiring privately funded and managed on-site solutions versus implementing publicly funded and managed stormwater projects such as larger culverts, storm drains and regional stormwater detention and water quality treatment facilities. The reality is that a combination of both strategies is needed to achieve the overall most-successful and cost-effective stormwater management system within a watershed.

A fundamental objective of stormwater management is to effect changes to the land use practices in the built landscape that will maintain the quality, quantity, and rate of runoff as close to the predevelopment condition as possible. Stormwater management strategies that attempt to meet this objective include preventing runoff at the sources by minimizing the amount of impervious surfaces, providing areas to detain water and slow its progress toward the streams and wetlands, amending soils in order to absorb more water, constructing filtration areas with vegetation to filter water as it moves across the land, and practicing good housekeeping both day-to-day and on construction sites in order to prevent sediment and other pollutants from washing into streams.

This report recommends that the threshold to trigger runoff treatment requirements be made more stringent in those basins draining to East Sound. The reason is to protect the biodiversity of East Sound, which is the highest priority marine resource at risk from watershed development. The Sound is particularly vulnerable to stress from pollutants due to the poor circulation and low volume exchange in the vicinity of Eastsound. A water quality goal of 90% capture (i.e., removal) of pollutants is recommended for stormwater discharge to East Sound.

Hydrologic Replication

The Stormwater Management program recommended by this report supports the practice of maintaining or replicating the predevelopment hydrologic regime through the use of design techniques designed to maintain a functionally equivalent hydrologic landscape. The hydrologic functions of storage, infiltration, and ground water recharge, and the volume and frequency of discharges are best maintained through the use of integrated and distributed micro-scale stormwater retention/detention/infiltration areas, the reduction of impervious surfaces, and the

lengthening of flow paths and runoff time. Other beneficial strategies include the preservation/protection of environmentally sensitive site features such as riparian buffers, wetlands, steep slopes, mature trees, flood plains, woodlands and highly permeable soils.

Source Control

This report recommends, to the extent feasible, controlling stormwater runoff at the source by the use of micro-scale controls distributed throughout each site. This approach differs from more conventional approaches that typically convey runoff to a single large facility located at the base of drainage areas. Using micro-scale controls allows for multifunctional site designs that can incorporate alternative stormwater management practices. For example, stormwater facilities can be designed as functional landscapes that hold water but allow other uses. Examples are the use of flatter grades, depression storage and open drainage swales that act as stormwater facilities but also provide open space. In addition, relying more heavily on on-site stormwater system controls can reduce or eliminate the need for larger conveyance systems and centralized control and treatment facilities. Although traditional stormwater control measures have been documented to effectively remove pollutants, there remain other negative consequences: natural hydrology is still impacted by inadequate base flows, thermal fluxes and highly fluctuating water flows, which have a detrimental effect on ecosystems, even when water quality is not compromised.

Low Impact Development

The effective use of Low Impact Development site design techniques can reduce the overall cost of stormwater management. Savings are achieved by eliminating the use of stormwater management ponds, reducing the need for culvert inlet structures, and curbs and gutters. Where Low Impact Development techniques are applicable stormwater and site development design construction and maintenance costs can be reduced by 25% to 30% compared to conventional stormwater management approaches. Low Impact Development practices offer an additional benefit in that they can be integrated into the project's infrastructure design and, in most cases, are more cost effective and aesthetically pleasing than traditional, structural, stormwater conveyance systems.

2. SCIENCE-BASED STORMWATER MANAGEMENT PROGRAMS

Following are a selection of Stormwater Management Programs that may be used in conjunction with traditional flow control measures to accomplish the previously stated goals and objectives for the Eastsound UGA. It is recommended that San Juan County undertake the described programs in order to support a science based approach to runoff management. The objectives of these recommended programs are as follows:

- *Provide for environmental protection of Eastsound's wetlands, riparian systems and receiving waters (i.e., East Sound).*
- *Encourage public education and participation in improving runoff management to better protect aquatic resources.*
- *Reduce the construction and maintenance costs for stormwater management infrastructure.*
- *Encourage conservation measures that reduce runoff and mitigate existing and future erosion and flooding problems.*
- *Introduce new concepts, technologies, and objectives for stormwater management such as multifunctional landscape features that mimic or replicate hydrologic functions and maintain the ecological and biological integrity of receiving streams and encourage critical aquifer recharge. These features include bioretention and conservation areas & swales.*
- *Promote techniques and strategies that maximize the use of on-site runoff controls.*
- *General descriptions of each of the stormwater Management Programs recommended for specific consideration in the Eastsound UGA are provided below. Basin recommendations for Stormwater Management Programs are provided in the Recommended Improvements section of each Basin report.*

Monitoring Program

Good planning is based on an understanding of current conditions. There currently is no baseline information documenting wetland water levels or stream flows for any of the Eastsound UGA drainage basins. This information is needed to analyze the relationship between existing wetland and riparian hydrology and what can be expected under future conditions. Monitoring data is needed to describe existing hydrologic patterns; otherwise predictions about the future will have a high margin of uncertainty and lead to a focus on conveyance strategies to prevent flooding impacts.

This SWMP is to design and implement a monitoring program of the major wetland and riparian systems within the Eastsound UGA's drainage basins. These wetland and riparian systems are shown on Figure 4 and described in Table C-1. Each wetland and riparian system described in Table C-1 discharges to either East Sound or President Channel.

Table C-1

WETLAND SYSTEMS WITHIN THE EASTSOUND UGA DRAINAGE BASINS

Riparian System	Drainage Basin	Wetland Area (Acres)	SJC Wetland Rating	Watershed Area (Acres)
Eastsound Swale	4 & 5	Approx. 23	Categories 2 & 3	185 & 223
Terrill Beach	7	Approx. 27	Categories 2 & 3	640
North Beach	5	Approx. 21	Categories 1 & 3	532
Crescent Beach	10	Approx 38	Categories 1, 2 & 3	203

Monitoring would be conducted to evaluate monthly and seasonal wetland water levels and water level fluctuations. Seasonal stream conditions and flow rates would also be monitored. This data will enable San Juan County to understand current conditions, determine the capacity of aquatic systems for storage, treatment, and habitat, and better define future stormwater infrastructure requirements.

Runoff Performance Targets

This SWMP would establish runoff performance targets for each wetland based on monitoring results and an understanding of the characteristics of a healthy watershed. Changes in the water balance and hydrologic flow patterns are the primary source of stormwater related impacts on watershed health thus, it is important to establish performance targets for managing runoff volume and runoff rate.

An appropriate performance target for managing runoff volume is to limit total runoff volume to 10% (or less) of total rainfall volume. This performance target may be effectively achieved by limiting the impervious area in a basin to less than 10% of the total basin area. This means that 90% of rainfall volume must be returned to natural hydrologic pathways, through infiltration, evapotranspiration or re-use on the development site. The following paragraph provides part of the justification for recommending this target.

Recent research in Washington State shows that stormwater related impacts on stream health start to occur once the impervious percentage of a watershed exceeds 10%. Therefore, to ensure the health of aquatic systems, developments should be planned and built to function like watersheds with less than 10% total impervious area. Stormwater-related impacts are a direct result of runoff from impervious surfaces that are directly connected to a storm drainage system or to downstream watercourses (often defined as effective impervious area (EIA)). The Washington State research is based on data from watersheds with traditional ditch and culvert

systems designed to remove runoff from impervious surfaces as quickly as possible and deliver it to receiving waters. There is little surface runoff from naturally vegetated portions of a watershed, however, nearly all rain that falls on directly connected impervious surfaces becomes runoff. Therefore, when the impervious area of watersheds with traditional ditch and culvert systems reaches the 10% threshold, approximately 10% of total rainfall volume enters receiving waters; this level of runoff is directly correlated with aquatic habitat degradation.

Other science-based indicators that the County should consider when establishing performance targets to protect watershed health are:

- *Maintaining stream base flow at a minimum of 10% of the Mean Annual Discharge (MAD).*
- *Retain at least 65% forest cover across the watershed.*
- *Preserve a 100 foot wide intact riparian corridor along all streamside areas.*
- *Maintaining key indicators of aquatic ecosystem health (e.g. maintain a Benthic Index of Biological Integrity score above 30).*
- *Maintaining natural total suspended solids (TSS) loading rates.*

These indicators of watershed health can be used to monitor the success of program objectives and will provide the information needed to evaluate the project within an adaptive management program. It would be ideal, but unlikely, that each of the above indicators will be applied to each basin in the Eastsound UGA. However, every effort should be made to maintain these indicators in the basins with the most sensitive and most highly valued wetlands and riparian areas.

Adaptive Management Program

This Stormwater Management Program would establish an adaptive management program that would inform and educate public and private entities as to the effectiveness of various Stormwater Management Programs in mitigating stormwater impacts. Adaptive management will provide a systematic process for gathering and analyzing information that would characterize the effectiveness of Stormwater Management Programs. This information would influence decision-making and implementation choices. Implementation of an effective adaptive management process will demonstrate progress toward the achieving runoff management objectives identified earlier in this section.

Effective adaptive management and monitoring programs will result in the following outcomes:

- *Increased knowledge of ecosystem processes and functions.*
- *Clearly defined, predictable roles and responsibilities that can be understood by managers as well as stakeholders.*
- *Evaluation of management decisions and actions at the local, watershed, and regional levels.*
- *Course corrections at predetermined milestones to ensure continual progress toward specific, measurable goals and objectives.*
- *Institutional activities and processes are improved as necessary.*
- *Ecosystem functions and processes are protected and restored.*

Watershed Restoration Program

This Stormwater Management Program would establish incentives and grants to support projects that would enhance runoff storage and treatment opportunities within a watershed that reduce the cost of publicly funded infrastructure requirements within a watershed while also protecting aquatic species and habitat.

The majority of wetland systems within the Eastsound UGA have been ditched and otherwise altered from a natural condition. The majority of streams tributary to the area wetland systems are ditches or highly incised and eroded channels. In general, all wetland riparian systems within the Eastsound UGA would benefit from restored hydrology, more moderate changes in wetland water levels, and control of noxious weeds. These enhancement activities would have the added benefit of increasing the water storage and water quality treatment functions of existing wetlands within the basins of the Eastsound UGA.

This Stormwater Management Program would create a fund to promote projects that would restore wetland habitat while also increasing wetland storage and treatment capacity. Examples include projects that:

- Remove existing fills in wetlands to restore and enhance water storage
- Restore natural meanders to swales and tributaries
- Increase pooling and wetted area in tributaries currently confined to ditches
- Improve hydraulic connectivity and habitat connectivity

Land and Easement Acquisition Program

This Stormwater Management Program is to identify and fund land acquisitions and drainage easements that are needed in the future to store, convey or treat

stormwater under build-out conditions. If these areas are not identified and reserved early on in the process they may not be available when needed which will generally result in a more costly and less desirable alternative.

Low Impact Development Cost Analysis

This Stormwater Management Program would provide for a cost analysis to identify short and long term costs and public and private costs associated with various land development scenarios, including the use of low impact development technologies. The project would seek to determine the best allocation of private development costs and publicly funded infrastructure requirements for the Eastsound UGA. The project would also evaluate the cost impact of implementing new stormwater requirements recommended for the Eastsound UGA.

Hydrological studies have demonstrated that dependence on stormwater collection and conveyance methods has resulted in serious degradation of habitat through altered flow regimes and channel degradation. Upland developments can create adverse downstream impacts through changes to stormwater runoff patterns. Urbanization promotes an increase in impervious area which in turn results in greater volumes and rates of stormwater runoff.

The historical approach to urban drainage design was to collect stormwater runoff in a system of buried culverts and remove it from the subject development site as quickly as possible. As the carrying capacity of stormwater collection systems and/or receiving streams was reached or exceeded, there developed a need to capture and temporarily detain runoff during and immediately after rainfall so that the stored water could then be released at a slower controlled rate within the capacity of the downstream conveyance system. These methods of stormwater control unfortunately have not provided adequate protection to riparian and wetland habitats.

Conventional stormwater conveyance systems are designed to collect, convey and discharge runoff as efficiently as possible. The intent is to create a drainage system, which will prevent flooding, and quickly convey runoff to a stormwater treatment facility or an acceptable receiving body of water. This rapid runoff conveyance system decreases the opportunity for water quality treatment and groundwater recharge, increases the volume of runoff, and changes the timing, frequency and rate of discharge. These changes can cause extended periods of stormwater inundation, water quality degradation, stream bank erosion and the need to construct end of culvert treatment and flow control facilities. Discharge rates using traditional strategies are often set to match the predevelopment peak rate for a specific design year. This approach controls only the peak rate of runoff and does not address the significant increase in runoff volume, or the increased frequency and duration of runoff in relation to the predevelopment conditions that produces ongoing degradation of natural streams and wetlands.

Traditionally, stormwater management systems have been designed to function well under a single design condition, (e.g. the 100 year flood, the 10 year storm, etc.). Designing control systems for a single extreme event does not ensure that these systems will perform satisfactorily under other scenarios. For example, designing major floodways for the 100 year event may over-drain and degrade aquatic systems during smaller more frequent storms. Flow control standards, which have their origin in ensuring public safety and reducing property damage, generally do not provide for ecosystem protection.

Low Impact Development techniques such as rooftop retention, permeable pavements, bioretention and disconnecting rooftop rain gutter spouts are valuable tools that can be used in the Eastsound UGA. For example, stormwater flows can easily be directed into rain barrels, cisterns or across vegetated areas. Further, opportunities exist to implement bioretention systems in parking lots with little or no reduction in parking space. Vegetated rooftops and permeable pavements are other ways to reduce impervious surfaces.

For preserving stream integrity, experience has demonstrated the importance of a stormwater system that specifically manages flows from frequent small storms. Decentralized site-based source controls, can, in most cases, handle the stormwater from these more frequent events. Additionally, if the full suite of LID controls and on-site design practices is creatively used, it is possible to control the 10 and 100-year storms through the primary strategy of retaining the built area's natural rainfall-runoff relationship. The more techniques that are applied, the closer to natural hydrologic function one gets. Where there are known flooding problems, however, a hybrid approach is suggested to reduce liability and protect public safety.

D. BASIN ANALYSES

The following section gives a basin by basin description of the physical drainage characteristics, problems and recommended solutions for each of the ten drainage basins shared by the Eastsound UGA. A list of recommended capital improvement projects (CIPs) is presented for each basin. These projects are assigned priorities and shown in the Long Range Capital Improvement Plan for the Eastsound UGA in Section E.

Table D-1 provides the reader a summary of basin area and the estimated stormwater runoff discharged by each basin for the 6-month, 25-year and 100-year design storm. Figure 5 is a soils map that provides data related to the potential for stormwater infiltration and runoff. Table D-2 gives information to help interpret the soils map.

Table D-1

SUMMARY OF BASIN OUTFALL DISCHARGE FOR DESIGN STORMS OF VARIOUS RETURN FREQUENCIES

Drainage Basin(s)	Basin Area (Acres)	24-Hr. Design Storm*		
		6-Mo.	25-Yr.	100-Yr.
		Peak flow in CFS		
1	39	3.3	14	17
2	24	1.3	10	13
3	17	0.7	6	8
2 & 3 **	41	1.8	15	19
4	185	5.3	49	64
1 & 4**	224	7.9	60	78
5	532	10.0	114	153
6	74	0.3	5	9
7	640	5.8	111	160
8	264	3.3	57	78
9	24	0.5	7	10
10	203	7.7	61	78
9 & 10**	227	8.1	67	86

* The 24-Hour rainfall associated with the 6-month, 25-Year, and 100-Year Design Storms are 1.02-inches, 3.0-inches, and 3.6-inches respectively.

** The estimated peak discharge for the combined Basins 2 & 3, 1 & 4, and 9 & 10 was obtained by adding 80% of the peak discharge of the smaller basin to the peak discharge of the larger basin. The purpose of making the 20% reduction in peak discharge from the smaller basin is to make a rough adjustment in the combined flows to account for the different time of concentration generally associated with basins of different size and shape.

**Table D-2
Soil Types in Eastsound UGA**

Soil Series	Map Symbol	SCS Soil Group	Depth to Seasonal High Water Table	Depth to Bedrock	Infiltration / Runoff Potential
Alderwood gravelly/stony loam	AgB AmB AmD AsB	C	2 to 3-ft	>10-ft	Well-drained soils
Bow gravelly silt loam	BoA BgA	D	2.5-ft	Deep	Imperfectly drained soils
Coveland silt loam	CsA	D	1.5-ft	Deep	Imperfectly drained soils
Everett gravelly sandy loam	EgB	A			
Indianola-Roche complex	IrB	A			
Neptune gravelly sandy loam	Ng	A			
Norma loam	Nm No	D			
Roche gravelly loam	RgA RgB RhB	D	1.5-ft	>10-ft	Slow drainage
Roche Rock outcrop	RxD		NA	2 to 5-ft	High runoff
Pickett-Rock outcrop	PrD	C	NA	>2-ft	
Semiahmoo muck	Sm Ss	D			

1. BASIN 1 – VILLAGE COMMERCIAL CORE

Basin Characteristics

Basin 1 is approximately 39 acres. The basin drains generally to the southwest via roadside ditches and a stormdrain system of catch basins and culverts (see Figure 6). The drainage system is publicly owned and maintained with the exception of the stormdrain along Market Street. The basin is fairly flat, for the most part, rising at a moderate rate (up to 10%) toward the north and west. There is a total elevation drop of about 85 feet across the basin.

Basin 1 is actually a sub-basin of Basin 4. It has been separated from Basin 4 because it is of a distinctly different character from the remainder of Basin 4. It contains the commercial core of Eastsound Village. Land use in the area is commercial and urban residential and the area is served by a system of catch basins and stormdrains. The remainder of Basin 4 is primarily a forested, low density rural land use.

The outlet of Basin 1 is defined as the manhole in the 30-inch stormdrain in front of the Episcopal Church on Main Street; this 30-inch stormdrain continues westward and connects to the 54-inch outfall that drains Basin 4 into Fishing Bay. The runoff computations used in modeling outflow from Basin 1 assumes 85% impervious surface area for the Village commercial land use and 38% impervious surface area for Village residential land use. The estimated runoff profile for Basin 1 is shown in Table D-1. The results of runoff modeling for the basis of culvert sizing for each basin in the Eastsound UGA are included in the appendices.

The soils in the basin are low permeability soils (Hydrologic series D) with fairly high runoff potential (Figure 5). The soil types are a significant constraint to the use of infiltration Best Management Practices. There may be opportunities to provide stormwater storage and treatment on-site by careful site planning and the employment of low impact development strategies.

Drainage Issues (Problems)

Seasonal flooding is currently a problem immediately downstream of the outlet to Basin 1, in the vicinity of the Outlook Inn and neighboring properties. During the 1996 storm flooding was reportedly within an inch of the floor elevation of the building to the east of the Outlook Inn. Property owners to the east of the Outlook Inn have reported basement and garage floor flooding. To mitigate future flooding in this basin, it is recommended that the flow control imposed on new development within this basin be made more restrictive until conveyance improvements are completed. A Standard similar to the Type-3 Flow Control Standard defined in the King County Surface Water Design Manual is recommended for Basin 1.

Localized flooding is contributing to pavement failure on the east side of Prune Alley near the southern entrance to the Island Market parking lot. The lack of slope in the road grade causes frequent standing water in this area.

Erosion

There are no known areas of erosion in Basin 1.

Flow Control and Treatment

There are no stormwater detention systems and only two small private stormwater treatment systems in this basin. There is a small biofiltration swale constructed in 1991 at the Island Market that provides some treatment for parking lot runoff. Another small biofiltration swale constructed in 1992 captures runoff from the Orcas Library parking lot and Pine St. to the north. Neither system has capacity to receive additional flow.

Conveyance

A stormwater drainage conveyance plan to assist in locating and sizing stormdrains for anticipated growth within the Eastsound core area was prepared by Steve Braun in 1983. However, the plan has not been followed as new culverts were installed. A recent review of the 1983 plan determined that the plan is relevant today and it was used in planning drainage projects for development within Basin 1.

Conveyance improvements are needed to drain the area in the vicinity of Prune Alley and Market Street where flooding is causing pavement failure.

Wetlands

There are no regulated wetlands located within Basin 1.

Easements

There are no County drainage easements off the County road right-of-way within Basin 1. However, there are locations where storm runoff from public roads travels across private property. One area is where the runoff from Pine Street flows across library property and other properties to connect to a stormdrain along Fern Street.

The County should acquire drainage easements for the Market Street Project (Project 1.6) in order to access public stormwater conveyance systems for maintenance.

Recommended Improvements (Solutions)

The recommended improvements in Basin 1 are shown on Figure 7.

Flooding

It is recommended that enhanced treatment requirements be applied in Basin 1 because of the relatively high percentage of pollution generating impervious surface and the Basin discharges into East Sound. The threshold for triggering treatment requirements should be lowered from the current 5000 SF of pollution generating impervious surface to 1000 SF of pollution generating impervious surface.

Construction of a flow splitter and a short section of stormdrain will correct flooding at the west end of Market Street by directing some storm runoff east towards the Crescent Beach wetlands.

Flow Control and Treatment

Following the construction of Projects 1.1 and 1.2 the County-owned property, in Basin 4, located south of the Seaview Theater and west of Village square (frequently referred to as the "Mount Property") should be developed to provide treatment for as much runoff from the Village core as is feasible. The County should consider acquisition of additional area south of this property to provide greater stormwater treatment capacity.

Conveyance

Runoff from the basin area located down gradient from Fern Street does not receive treatment. Catch basin insert, spill control inlets, oil water separators or "Stormceptor" units should be considered for installation in this area to provide pollution protection to East Sound.

Wetlands

There are no wetlands in Basin 1.

Easements

The County should acquire an easement to construct and maintain the improvements proposed at the west end of Market Street.

Projects

Below is a listing, with brief descriptions, of the drainage improvement projects recommended to meet future development in Basin 1. The anticipated timing and estimated cost (in 2005 dollars) are given in Table E-1.

1.1 Prune Alley to Water Quality Facility Stormdrain

Construct 400 lf of 18-inch Stormdrain w/two Type-2 and one Type-1 catch basins across County property and right-of-way.

The project will divert flow from the North Beach Road and Prune Alley stormdrains North of Fern Street to the water quality facility and allow treatment for this portion of the basin.

1.2 Fern Street Stormdrain: Madrona Street to Prune Alley

Construct 480 lf of 18-inch stormdrain w/three Type-2 catch basins along Fern Street and 200 lf of 12-inch stormdrain w/two Type-1 catch basins along Madrona Street. The catch basin at the juncture of Madrona and Fern Streets may be as deep as 20-ft.

The project is necessary to provide conveyance and connection to the Prune Alley stormdrain and allow a larger portion of the basin to be provided treatment. Adopted street development plans will require these stormdrain improvements. A 15 to 20-foot deep trench near Madrona Street would allow

development east of Madrona Street to connect to the stormdrain and avoid on-site detention wetland impacts. An environmental study is recommended to estimate the impact of this diversion to the Crescent Beach wetland and to Ship Bay.

1.3 Rose Street Stormdrain: Madrona Street to Prune Alley

Construct 560 lf of 12-inch stormdrain with five Type-1 catch basins along Rose Street and 250 lf of stormdrain with four Type-1 catch basins along Madrona Street.

The project is necessary to provide conveyance and connection to the Prune Alley stormdrain and support future sidewalk, curb and gutter development along Rose Street.

1.4 Pine Street Stormdrain

Construct 425 lf of 12-inch stormdrain with six Type-1 catch basins along Pine Street.

The project will provide conveyance connection to the Rose Street stormdrain and complement future sidewalk, curb and gutter improvements.

1.5 School Road Stormdrain: Madrona Street to Prune Alley

Construct 550 lf of 12-inch stormdrain with six Type-1 catch basins along School Street.

The project is necessary to provide a conveyance connection to the Prune Alley stormdrain and allow future street development.

1.6 Market Street Stormdrain Improvements

Construct flow splitter manhole and 100 lf of Stormdrain at the west end of Market Street and 230 lf of 12-inch stormdrain with five Type-1 catch basins at the east end of Market Street and north along Madrona Street.

The project is necessary to provide a conveyance connection to the Prune Alley stormdrain and allow future street development on Madrona Street. The project would correct the flooding problem near the entrance to Island Market. The Crescent Beach wetland would be protected by diverting increased flows to Prune Alley while maintaining historic flows to the wetland. A flow splitter would be needed near Prune Alley to limit the flow to the existing biofilter treatment system for the Island Market parking lot, and send the increased flow directly to the Prune Alley stormdrain. The existing stormdrain system is on private property and would require a drainage easement and agreement for public use.

2. BASIN 2 – WATERFRONT PARK

Basin Characteristics

Basin 2, shown on Figure 2, is approximately 24 acres and is located entirely within the Eastsound UGA boundary. The basin drains generally to the east along Geer Lane to a 12-inch culvert crossing Lover's Lane. It continues overland to a second 12-inch culvert crossing Main Street and then overland across Waterfront Park to Fishing Bay. The upper portion of the basin, to the west of Lover's Lane is characterized by steep (30%) slopes on Double Hill. East of Lover's Lane the basin flattens to a slope of about one percent (1%).

Basin 2 soils are composed of hydrologic soil groups C and D with limited permeability and therefore greater runoff potential than other soils (see Figure 5). There is little opportunity for infiltration systems in this basin due to the steep slopes and tight soils.

The largest part of the basin is covered with second growth forest, although there are roads and some residential development near the top of the knoll and at the base of the basin.

Figure 1 shows the current land use within the basin. Twelve acres of the basin has a land use designation of 2 dwelling units per acre (DU/Ac). Eight acres are designated 1 DU/Ac and four acres are designated as 4 to 12 DU/Ac. At these densities runoff from this basin would be significantly higher than current conditions.

Figure 8 shows the existing stormdrainage facilities for Basin 2 and Table D-1 shows the estimated runoff for the basin. The estimated runoff rates for build-out conditions in the basin are calculated at the culvert (C-1) that crosses Main Street. A 24-inch diameter culvert would be an appropriately sized culvert for flows of this magnitude. A preliminary evaluation indicates that it would be cost-effective to combine the flows from Basin 2 and 3 into a single slightly larger outfall. See discussion in Basin 3.

Drainage Issues (Problems)

Flooding

There are no known flooding problems in Basin 2.

Erosion

Erosion problems exist along Geer Lane due to the steepness of the road and lack of properly constructed roadside ditching. Gravel is frequently washed across Lover's Lane from Geer Lane during large storms. It is expected roadside erosion along Geer Lane will increase as the upper basin develops. Erosion is not noticeable at Waterfront Park but as the basin develops and basin discharge increases erosion is anticipated at this location.

Flow Control and Treatment

There is only one known detention and treatment system in Basin 2. It was recently installed at the corner of Lover's Lane and Main Street for the Mann Short Plat. The system serves an area of roughly 1 acre with a biofiltration swale and pond.

Conveyance

Geer Lane has road grades of 12% to 15% and lacks an adequate roadside ditch. Runoff erodes the road surface and carries gravel out onto Lover's Lane. The 12-inch culverts located across Main Street and across the driveway for the Washington Federal Saving and Loan Building are nearing peak capacity and may require replacement with larger culverts as upper basin development occurs.

Wetlands

A Category II forested wetland of about 5 acres is located north of Main Street and east of Lover's Lane. A preliminary assessment of stormwater runoff flows suggests that this wetland should be protected by upstream treatment and flow control. Increases in runoff flows from future development should bypass the wetland to avoid degradation of the wetland environment.

Easements

Other than the road rights-of-way there are no County drainage easements in Basin 2. The County road rights-of-way are used to convey stormwater. The outlet from the culvert at Lover's Lane flows across private property until it reaches Main Street. The Lover's Lane and Main Street rights-of-way provide access to Waterfront Park, which is owned by the San Juan County Land Bank.

Recommended Improvements (Solutions)

The facility improvements recommended in Basin 2 are shown on Figure 9.

Flooding

None

Erosion

The erosion along and on Geer Lane should be corrected by providing a paved surface, and an adequately sized and graded ditch with rock lining and check dams. A stabilized route for increased flows across Waterfront Park should also be provided.

Flow Control and Treatment

It is recommended that an enhanced treatment requirement should be applied to Basin 2 due to the outflow into East Sound. The threshold for triggering the treatment requirements should also be lowered in this basin from 5000 SF of pollution generating impervious surface to 1000 SF of pollution generating impervious surface.

Detention should be required in Basin 2 until adequate conveyance improvements (including wetlands bypass) have been made downstream of the development.

Conveyance

Developers may elect to fund improvements to the basin conveyance system in lieu of providing on-site detention.

The basin outfall culvert under Main Street will need to be replaced with a larger culvert in the near future. A culvert system or improved ditching should be used to convey runoff down the steep grades along Geer Lane.

Wetlands

In order to protect the wetland within this basin, a flow splitter is proposed near the end of Geer Lane at Lover's Lane to allow existing flows to continue flowing to the wetland and allow higher flows to bypass the wetland and flow down to the Waterfront Park outfall.

Easements

A public drainage easement or inter-local agreement with the San Juan County Land Bank should be acquired to allow construction of the outfall stream at Waterfront Park.

Regional Improvements

A regional treatment solution should be developed due to the difficulty of providing onsite treatment on the small, steep lots. The feasibility of providing treatment with a biofiltration swale at the Waterfront Park should be evaluated. The King County Stormwater Design Manual indicates that biofiltration swales may be used to treat runoff from areas of 5 acres or less.

The outfall culverts from both Basin 2 and Basin 3 will require replacement in the near future, for reasons of capacity and deterioration. A cost-effective solution that would serve and benefit both basins is to convey the runoff from both basins to a single 24-inch culvert under Orcas Road near the intersection with Main Street. This improvement is listed under Basin 3 improvements.

The existing 12-inch culvert crossing Main Street will be adequate to handle runoff from the portion of Basin 2 located East of Lover's Lane.

Projects

Below is a listing, with brief descriptions, of the drainage improvement projects recommended to meet future development in Basin 2. The anticipated timing and estimated cost (in 2005 dollars) are given in Table E-1.

2.1 Lover's Lane Stormdrain: Geer Lane to Waterfront Park.

Construct a flow splitter manhole and 420 lf of 12-inch stormdrain.

This project is necessary to protect the Eastsound Swale by diverting increased flows to the basin outfall. Biofiltration swale treatment at the bottom of the basin is needed due to the small lot sizes and steep slopes which would make proper on-site treatment very difficult and costly.

2.2 Geer Lane Roadside Ditch Improvements.

Construct 1320 lf of ditch improvements including rock lining and twenty-six check dams.

This project is necessary to stabilize Geer Lane and avoid ongoing erosion and maintenance problems. Rock check dams would slow down the ditch flow.

3. BASIN 3 – GAILEY'S FIRST ADDITION

Basin Characteristics

Basin 3, shown in Figure 1, is approximately 17 acres in size, nearly all within the Eastsound UGA boundary. The basin drains to the south and southeast to a roadside ditch on the west side of Orcas Road. The basin is characterized by steep (30%) slopes. The transverse roadside ditch along Orcas Road that intercepts the runoff has a grade that ranges from 12% upslope to about 1% as the ditch turns to the north and approaches Main Street.

There is a roadside gravel lined depression on the inside of the 90° turn where Orcas Road turns north. Observations show that this depression intercepts and absorbs the upslope ditch flow. The flow likely infiltrates and flows southeast under the County Road. The Public Works Department reports that the depression may be the remains of an old limestone pit.

The soils in Basin 3 are composed of hydrologic soil Groups C and D with limited permeability and therefore above average runoff potential. Figure 5 shows the distribution of soils in Basin 3. Due to the steep slopes and soil types, there is little infiltration in Basin 3.

There are no known wetlands in the basin. A culvert at the Main Street and Lover's Lane intersection allows flows to cross over to a lot with ownership shared between 20 or 30 property owners of Gailey's First Addition Long Plat. Although much of the basin is covered with second growth forest there are a number of roads and some residential development.

The current land use designation within the basin allows a maximum residential density of 2 DU/Ac on 15 of the 17 acres within the basin. The remaining 2 acres has a land use designation of 1 DU/ 5 acre. Gailey's First Addition which occupies most of the basin area has been subdivided at a density of less than 4 DU/Ac. Most of the lots are 50' x 190' and on steep slopes. Development on these lots are not likely to trigger the Stormwater Management Manual threshold for detention or treatment due to the small lot sizes.

The existing storm drainage facilities in Basin 3 are shown on Figure 8. The estimated runoff for Basin 3 is shown in Table D-1. The flow rates were calculated for the basin discharge at culvert C1.

It is estimated that an 18-inch culvert would be appropriate for the future flows expected at the outlet of Basin 3; however, as discussed in Basin 2, it is recommended that a single outfall be used to convey the flows from Basin 3 and the upper portion of Basin 2. A single improved outfall would be easier to permit than two, and construction costs should be significantly less.

Drainage Issues (Problems)

There are no known flooding problems in Basin 3.

Erosion

There are no significant erosion problems within Basin 3. It is expected, however, that due to the steep slopes in the basin, erosion problems may result from increased development.

Flow Control and Treatment

There are no known stormwater treatment facilities in Basin 3.

A biofiltration swale or other form of treatment located downstream of the basin outfall on the San Juan County Land Bank property should be considered to provide water quality protection to Fishing Bay.

Conveyance

The high rate of seepage in the ditch on the upslope side of Orcas Road could lead to saturation of the road base material. This seepage is believed to have contributed to the road failure that occurred in the mid 1990s in this area. Conveying runoff past this area would remedy this problem.

Wetlands

There are no wetlands in Basin 3.

Easements

There are no known public drainage easements in this drainage basin. The County road rights-of-way along Orcas Road are used to convey stormwater.

Recommended Improvements (Solutions)

The stormdrainage improvements recommended in Basin 3 are shown on Figure 9.

Flooding

None

Flow Control and Treatment

It is recommended that an enhanced treatment requirement be applied to Basin 3 due to the outflow to East Sound. The threshold for triggering the treatment requirements should also be lowered in this basin from 5000 SF pollution generating impervious surface to 1000 SF pollution generating impervious surface.

Detention should be required in Basin 3 until adequate conveyance improvements have been made downstream of the development. Developers may elect to fund improvements to the basin conveyance system in lieu of providing onsite detention.

Conveyance

The roadside ditch along Orcas Road should be replaced with a stormdrain to prevent the seepage of stormwater under Orcas Road.

Easement

A County drainage easement or inter-local agreement should be acquired to allow construction of the outfall stream at Waterfront Park.

Regional Improvements

A combined outfall for Basins 2 and 3 should be considered. On-site treatment would be very difficult to provide given the small lot sizes, thus, a combined regional treatment facility should be considered for Basins 2 and 3.

Projects

Below is a listing, with brief descriptions, of the drainage improvement projects recommended to meet future development in Basin 3. The anticipated timing and estimated cost (in 2005 dollars) are given in Table E-1.

3.1 Orcas Road Stormdrain and Outfall

Construct 600 lf of 18-inch stormdrain with two Type-1 and one Type-2 catch basins, also construct 125 lf of 30-inch culvert and 250 lf of biofiltration swale.

This project is needed to combine Basins 2 and 3 and prevent road base saturation and avoid potential ditch erosion problems. This project would provide treatment for the basin by providing connection to the Waterfront Park biofiltration swale.

A 24-inch culvert is a probable estimate for the combined basin outfall. This size was estimated by adding the peak flow from Basin 3 with 2/3 of the peak flow from Basin 2. A portion of Basin 2 upper basin flow will be diverted to the wetland east of Lover's Lane. An engineering evaluation is necessary to determine the appropriate size culvert.

4. BASIN 4 – EASTSOUND SWALE

Basin Characteristics

Basin 4 is approximately 185 acres, of which 46 acres are outside of the Eastsound UGA boundary. Since the outside area drains through the Eastsound UGA the entire basin is included in this report. The basin drains generally to the west to culverts at Lover's Lane. The basin is essentially a valley on the northern side of Double Hill which is generally bounded by Enchanted Forest Road. The watershed is characterized by steep (30%) slopes on the slopes of Double Hill which flatten to about 8% as it approaches Lover's Lane and flattens further to 1% in the valley bottom (Eastsound Swale).

Basin 4 soils are composed of hydrologic soil Groups C and D with limited permeability and therefore greater than average runoff potential is expected. Figure 5 shows the distribution of soils in Basin 4. Due to the soil types, there is little chance for infiltration systems in this basin.

A wetland and stream course is located to the east of Lover's Lane and in the southern portion of the Eastsound Swale, which extends and includes the Outlook Inn Ponds near Main Street. Nearly the entire basin flows through the Eastsound Swale. Culverts and ditches concentrate most of the flow into the Eastsound Swale at Enchanted Forest Road where three 24" culverts cross the County road. The outlet to the ponds north of the Outlook Inn consists of an 18-inch CMP and a 12-inch overflow both of which connect to the 54-inch basin outfall to Fishing Bay.

About 90 percent of the basin is covered with second growth forest while the lower elevations with flatter topography are a mix of forest and pasture. The aerial photograph shows thin forest cover in much of the lower portion of the basin with pasture toward the north end of the Eastsound Swale. Residential development is generally scattered throughout the basin but there is some commercial and multi-family development along Orion Lane.

Figure 1 shows the current land use boundaries and the maximum residential densities allowed under the County Comprehensive Plan. The land use at the west end of the basin outside of the Eastsound UGA boundary, are Rural Farm Forest and Rural Residential with a maximum density of 1 DU/5 acres. Inside the Eastsound UGA there is Residential land use at 2 DU/Ac, plus Village Residential, Commercial and Light Industrial.

Figure 8 shows the existing stormdrainage facilities in Basin 4. The estimated runoff for Basin 4 is shown in Table 4. The runoff rates were calculated for the basin discharge at culvert C1.

A 42-inch culvert would be appropriate for flows of this magnitude. These flows are calculated at the discharge culvert of the Outlook Inn pond.

Drainage Issues (Problems)

Flooding

Seasonal flooding is currently a problem on properties abutting the Eastsound Swale and particularly at the low area near the Outlook Inn Ponds. The Eastsound Swale includes portions of about eighteen privately owned parcels of land. About 10 buildings are within the Eastsound Swale buffer zone which could be subject to flooding. To mitigate existing and anticipated flooding conditions in this basin, it is recommended that Type 3 flow control standards as defined in the King County Surface Water Design Manual be applied to Basin 4 until conveyance improvements are completed.

Another area that experiences frequent flooding and standing water is the area in front of the Seaview Theater and the US Post Office parking lot on "A" Street. The owner of the Seaview Theater has reported that the lack of curb and stormdrainage has allowed street runoff to flood the entrance and northeast corner of the Theater building. The lack of drainage at the East side of the US Post Office parking lot has allowed saturation of the soil and has contributed to pavement failure.

Erosion

There are signs of erosion near the outlet of the 54-inch outfall. The shore-side wall at this location had been partially undermined and was recently rebuilt. A stairway to the beach adjacent to the wall currently provides protection for existing flows. As flows increase greater protection may be needed. There is no significant erosion within Basin 4. It is expected however, that due to the steepness of the north side of Double Hill erosion problems may result from increased development.

The outflow of the "A" St. stormdrain discharging to the Eastsound Swale could also become an erosion problem in the future if flow in this line increases significantly.

Flow Control and Treatment

There is one stormwater treatment and detention system in Basin 4 installed by the Christian School at the south and east end of Orion Lane. There are several wetlands in Basin 4, most notably the Eastsound Swale running parallel and to the east of Lover's Lane.

At present there is no public treatment of storm runoff within the basin. The Public Works Department has a preliminary design for a treatment system to be located on the former "Mount Property" that would treat about half of the flow from the basin. However, there are no funds appropriated to complete the design and construct the facility.

Conveyance

The entire flow path between Enchanted Forest Road and Main Street will require significant improvements to accommodate increased flows. In general, the culverts and ditches along the drainage way are too small. Based on the size of the contributing area, we would expect that a culvert along Lover's Lane will need to be enlarged.

The Enchanted Forest Road culverts may be adequate for planned increased development but they will require further study when developments are proposed in the contributing areas. It is expected that the open ditch conveyances between View Haven Road and the low point on Enchanted Forest Road (near Orion Lane) will eventually require deepening and widening in order to avoid inundation and saturation of adjacent properties along the routes. Finally, as a Category 2 wetland this area is protected so a wetland bypass system is needed.

Wetlands

The Eastsound Swale will require protection from the runoff generated by increased development. Increased flows will be required to bypass the wetlands to avoid degradation of the wetland environment. The potential increase in upper basin runoff to the Eastsound Swale for the build-out scenario is substantial and could, with no additional controls, require a bypass stormdrain as large as 42-inch. More restrictive on-site flow control would reduce the size and expense of a wetlands bypass drain line.

The small unregulated wetland at the "Mount Property" Water Quality Treatment Site would be filled to allow construction of the stormwater treatment facility. A flow splitter is proposed near the end of "A" St. to divert excess flows from the "A" Street stormdrain and thus, protect the Eastsound Swale from the increased rates of runoff associated with additional development. Base flows would go to the Eastsound Swale while peak storm flows would be routed to bypass the Swale.

Easements

There are no County drainage easements in this drainage basin. The County road rights-of-way are used to convey stormwater along small segments of the flow path. Main Street provides drainage connection to Fishing Bay at the bottom of the basin. Without drainage easements in place the County cannot maintain the channels and erosion and flooding may result. This could be cause for future litigation as flows increase.

A drainage easement will be required to construct and maintain the "A" Street to Main Street stormdrain (Project 1.1, scheduled for 2005) and the Market Street Stormdrain (Project 1.10). Without drainage easements the County will not be able to maintain the drainage system to mitigate flooding and erosion. The result may be a cause for future litigation as flows increase.

Recommended Improvements (Solutions)

The recommended improvements in Basin 4 are shown on Figures 7 and 9.

Regional Improvements

Regional treatment is not feasible due to the high flow rates.

Flooding

Construction of an enlarged outfall from the Outlook Inn ponds together with construction of a wetlands bypass should mitigate flooding problems in the vicinity of the Outlook Inn. The construction of drainage improvements along "A" Street and installation of a flow splitter to divert surplus flow to the South toward the basin outlet should alleviate flooding in the vicinity of the Seaview Theater.

Erosion

An energy dissipater may be required at the discharge of the 54-inch outfall to prevent significant scouring and beach erosion at full development flows.

Flow Control and Treatment

It is recommended that an enhanced treatment requirement be applied to Basin 4 due to the outflow to East Sound. The threshold for triggering the treatment requirements should also be lowered in Basin 4 from 5000 SF pollution generating impervious surface to 1000 SF pollution generating impervious surface.

Detention should be required in Basin 4 until adequate conveyance improvements (including wetlands bypass) have been made downstream of the development.

Conveyance improvements to the public stormdrain system may be paid for by developers in lieu of on-site detention.

A flow splitter is proposed near the end of "A" St. to protect the wetland from increased rates of runoff in Basin 4. Base flows would go to the wetland while high flows would bypass (go directly south).

Wetlands

The cumulative impacts to the Eastsound Swale from development should be mitigated by providing a flow splitter bypass to accommodate increased flows so that historic flows through the wetland are maintained, and higher flows are conveyed directly south to Fishing Bay.

Easements

Drainage easements should be obtained by the County where needed along the route of the wetlands bypass system.

The County must acquire drainage easements in order to construct a stormwater conveyance system between the "Mount Property" and the 54-inch outfall at Main Street. It is not likely that the "Mount Property" is large enough to construct a treatment facility with adequate capacity to treat runoff from future development within the Village Commercial Core much less all the runoff from the upper portion of the basin. The County should give high priority to acquiring additional area for treatment from the adjacent property to the South (Nelson).

Projects

Below is a listing, with brief descriptions, of the drainage improvement projects recommended to meet future development in Basin 3. The anticipated timing and estimated cost (in 2005 dollars) are given in Table E-1.

4.1a. "Mount Property" to Main Street Stormdrain: Phase 1

Construct 90 lf of 48-inch stormdrain, a 72-inch manhole and 240 lf of biofiltration swale.

This system will convey flow from the "Mount Property" to the 54-inch outfall. The adjacent property owners have indicated a willingness to donate the easement necessary to construct and maintain the system. Upstream developers may wish to assist in funding this project in exchange for a waiver of on-site detention requirements.

4.1b. "Mount Property" to Main Street Stormdrain: Phase 2

Construct 150 lf of 48-inch stormdrain, a 72-inch manhole and a 72-inch inlet structure. System will convey flow from the Eastsound Swale (Outlook Inn ponds) to the 54-inch outfall at Main Street. The owner of the Outlook Inn has indicated a willingness to donate the easement necessary to construct and maintain the system.

This project is necessary to eliminate flooding near the outlet of the basin and for protection of the Eastsound Swale.

4.2 "Mount Property" Stormwater Treatment Facility

Construct a wet pond stormwater treatment system on "Mount Property" site. The site is primarily a wooded wetland. The treatment system will accept stormwater from the "A" Street to "Mount Property" stormdrain described by Project 4.3 and the Village Square stormdrain described by Project 1.1. Developers may participate in funding this project in exchange for a waiver of on-site treatment facilities.

This project is necessary to provide treatment for runoff from future street improvements and other pollution generating surfaces within the basin.

4.3 "A" Street Storm to "Mount Property" Stormdrain with Flow Splitter

Construct a 48-inch flow splitter manhole plus 240 lf of 18-inch stormdrain, 210 lf of 12-inch stormdrain and two Type-1 catch basins. The County may require additional easements to construct and maintain the facility. Upstream developers may assist in funding this project in exchange for a waiver of on-site detention requirements.

This project is necessary to protect the Eastsound Swale by diverting increased flows from new development upstream from "A" Street to the "Mount Property". This project would correct flooding and pavement failure problems near the US Post Office and Seaview Theater and allow future street development.

4.4 Eastsound Swale Bypass Stormdrain: Enchanted Forest Road to Main Street with Flow Splitter Manhole

Construct 72-inch Flow Splitter Manhole, 1850 lf of 42-inch stormdrain and 240 lf of 18-inch stormdrain. The County may also need to acquire an easement to construct and maintain this system.

This project is necessary to protect the Eastsound Wetland by bypassing increased flows from development in the upper basin while allowing historic flows to pass through the wetland.

4.5 Enchanted Forest Road Improvements: View Haven Road to Orion Lane

Construct 3200 lf of roadside ditch improvements (both sides of road) including 800 lf rock lining.

This project is necessary to improve conveyance along Enchanted Forest Road, to accommodate increased flow from development in the upper portion of the basin, and to direct flow to flow splitter.

4.6 Fishing Bay Outfall Erosion Protection

Install rock armoring beyond discharge end of outfall culvert to protect stairway and dissipate the energy of high flows.

This project is necessary to mitigate erosion at the discharge end of the outfall as flows from the drainage outfall increase in rate and duration.

4.7 Eastsound Swale Enhancement

Reconfigure existing ditches contributing to, and located within, the swale to provide for more storage and treatment.

Design and implement a restoration and enhancement project that would improve habitat while increasing the treatment and storage capacity of the Eastsound Swale.

5. BASIN 5 – AIRPORT

Basin Characteristics

Basin 5 is approximately 532 acres. About a quarter of Basin 5 is outside the Eastsound UGA boundary but, because it drains through the Eastsound UGA, it is considered in this report. The basin drains to two outfalls: one located to the east of the airport at Brandt's Landing Marina and the other immediately to the west of the airport runway. The basin is essentially a broad valley with the airport runway at its centerline. With the exception of the steep grades near the base of Double Hill the basin slopes gently northward with grades in the range of 3 to 5%. The ditch grades across the lower basin and within the airport property are about 1%.

The drainage characteristics of Basin 5 were studied in detail in 2003 as part of the "Airport Drainage Basin Study", (Hart Pacific Engineering; March 2003). The basin boundary used in the 2003 study varies slightly from that shown in Figure 2. The change is not considered significant and the findings of that study are used in this report.

The soils in Basin 5 are a mix of low and high permeability soils. Figure 5 is a map of soils distribution within the Eastsound UGA. The more permeable soils (SCS hydrologic soil Group A) are located in three areas and comprise about 15% of the basin area. The permeable soil types provide good opportunities for infiltration systems. The remainder of the basin is composed of hydrologic soil Groups C and D of limited permeability and therefore greater runoff potential. In these areas, there is little or no chance for infiltration systems.

Runoff from the basin is intercepted in a series of road ditches and culverts and conveyed to either the east or west side of the airport drainage system. The two sides of the airport system are joined at the north end of the runway by a cross-culvert under the runway. Little is known about this culvert though flow was observed flowing west toward the large Class 1 wetland on the west side of the runway. The basin flow is discharged via the two outfall culverts described above. The 2003 airport drainage study divided Basin 5 into two sub-basins; one feeding the east airport drainage system and the other the west system.

The higher elevation of the basin is largely second growth forest while the lower elevations are a mix of forest and pasture. There are about 175 acres of pasture scattered throughout the central portion of the basin. There are three notable wetlands in the basin totaling about 50 acres. The northerly most wetland is about 21 acres in extent and is discussed in detail in the Airport Drainage Basin Study. It receives runoff flow directly from an area of approximately 178 acres on the west side of the basin and indirectly from about 353 acres on the east side of the basin via the 18" cross-runway culvert.

In addition to the development on the airport property there are industrial/commercial developments along Mt. Baker Road. The remainder of the basin is residential use.

with development scattered throughout the basin. The most concentrated residential development area in the basin is north of Mt. Baker Road in the Seaview St. and Blanchard Road areas.

Figure 1 shows the current land use and the maximum development densities allowed under the County Comprehensive Plan. Outside the Eastsound UGA boundary the land use is Rural Residential with allowable densities ranging from 1 DU/5 Ac to 1 DU/20 Ac. Inside the Eastsound UGA the land use densities vary from 2 DU/5 Ac to 12 DU/Ac.

The existing stormdrainage facilities in Basin 5 are shown on Figures 10 and 11. The basin is served by two outfalls; an 18-inch culvert to Brandt's Landing marina and a 24-inch culvert to President Channel. Both outfalls are fitted with tide gates to prevent backflow during high tides. The estimated peak runoff rates for the basin shown in Table D-1 are the sum of the runoff discharged by the two outfalls.

The Airport Drainage Basin Study recommended a 36- to 48-inch culvert for the marina and a 36-inch outfall for the western outfall discharging to President Channel.

Drainage Issues (Problems)

Flooding

The Airport Property experiences flooding in the northeast corner when the tide gates are closed and stormwater runoff is unable to discharge. The Airport Drainage Basin Study from 2003 determined that both outfalls are undersized and will need replacement to accommodate future flows.

As development continues it is expected that additional properties will experience flooding conditions if drainage improvements are not made. To mitigate existing and anticipated flooding conditions in this basin, it is recommended that a more restrictive flow control standard be placed on development in the basin until conveyance improvements are completed. A Type-3 flow control standard as defined in the King County Surface Water Design Manual is recommended.

Another area of occasional flooding is the west side of Blanchard Road near the intersection with Bunny Lane. The impacted property owner has filed a complaint about this situation with the Public Works Department.

Erosion

Public Works staff has noted erosion problems along Twiggs Lane due to the lack of roadside drainage ditches. As development continues the stream course west of Lover's Lane could also become a stream bank erosion problem.

Flow Control and Treatment

It is recommended that an enhanced treatment requirement be applied to Basin 5 to

protect the wetlands at the center and north-end of the basin. The threshold for triggering treatment requirements should be lowered from 5000 SF of PGIS to 1000 SF of PGIS.

Detention is recommended in Basin 5 until adequate conveyance improvements (including wetlands bypass) have been made downstream of the development.

Conveyance

The existing stormdrain system along the east side of the airport property is comprised of 18-inch to 24-inch culverts and are not adequate to convey the higher flows expected in this basin. Based on the size of the contributing area, the culverts along the west side of Mt. Baker Road will need to be replaced with a larger culvert. The Mt. Baker Road culverts east of the Airport may be adequate for future development but they will require further evaluation. The open ditch conveyance between Gibson Road and Lover's Lane will need enlarging in order to avoid flooding and saturation of the road base and adjacent properties along this route. The roadside ditches and culverts along Mountain View Street, and North Beach Road between Mt. Baker Road and Autumn Lane will also require improvements to accommodate anticipated future development.

It is anticipated that some developers may contribute to improvements of the County storm conveyance system in lieu of providing onsite detention.

Wetlands

Current regulations generally do not allow increased flow to existing regulated wetlands. The Stormwater Management Manual precludes sending increased flows to existing wetlands unless specific wetland studies determine that the wetlands have capacity to accept the increased flow without adverse affects. A preliminary wetland assessment made by Herrera Environmental Consultants in 2003 recommends that the wetlands in Basin 5 be protected by flow control and treatment of runoff from upstream development. Increased flows should bypass wetlands to avoid degradation of the wetland environment. Historic flows to the wetlands should be maintained.

Drainage Easements

There are no County drainage easements in this drainage basin. The County road right-of-ways are used to convey stormwater. Lover's Lane and North Beach Road provide a large part of the basins major conveyance route but a portion of the route passes through property owned by the Port of Orcas and others to reach President Channel. Without drainage easements the County cannot maintain the channels and erosion and flooding may result. This could be a cause for future litigation as flows increase.

Recommended Improvements (Solutions)

The stormdrainage improvements recommended in Basin 5 are shown on Figure 12.

Flooding

None

Erosion

It is expected that the standard Stormwater Management Manual thresholds for flow control should be adequate to protect the stream course west of Lover's Lane.

Flow Control and Treatment

It is recommended that standard treatment be required for developments that meet the 5000 SF pollution generating impervious surface threshold. It is also recommended that detention be required in Basin 5 as mitigation for wetland impact, to reduce flooding problems and reduce the size and expense of downstream conveyance systems. Basin 5 has areas of highly infiltrative "A" soils in the Seaview Street area. It is recommended if allowed by groundwater depths that infiltration systems be encouraged in lieu of detention in this area.

Conveyance Improvements (Solutions)

The Airport Drainage Basin Study recommended a 48-inch culvert for the marina outfall and a 36-inch North outfall. It is recommended to construct a 42-inch stormdrain system along the West side of the Airport between Lover's Lane and the North Shore to divert flow from the under capacity system on the East side of the Airport and thus prevent the need to replace the entire system in the future.

Wetlands (Solutions)

As mitigation for impacts to the wetlands, a bypass stormdrain system is recommended between Lover's Lane and the North Shore. The estimate size of the system would be about 42-inch diameter and would be additional to the existing 24-inch north outfall. The marina outfall could then be improved to about 24-inch with minor improvements in ditching and culverts on the east side of the runway. The new 42-inch north outfall would include three flow splitters to regulate the flow into the northern portion of the Eastsound Swale and the Airport Wetland, allowing increased flows to bypass the wetland resources.

Easements (Solutions)

Drainage easements will be needed to allow construction of the conveyance improvements along the west side of runway and to improve the conveyance between North Beach Road and the Airport's east outfall. A drainage easement will also be needed along Nina Lane to allow flow splitter and connection to the improved west outfall.

Regional Improvements (Solutions)

Regional treatment may not be feasible in this basin because of the high flow rates and the high cost to develop a treatment facility. There are no large parcels of County land appropriately located. The need to treat discharge to President Channel is not as great as it is for discharge to East Sound because President Channel, unlike East Sound, has great flushing action that provides high rates of dilution and dispersion to stormwater discharge.

Projects

Below is a listing, with brief descriptions, of the drainage improvement projects recommended to meet future development in Basin 3. The anticipated timing and estimated cost (in 2005 dollars) are given in Table E-1.

5.1 West Airport Stormdrain: Lover's Lane to North Shore

Construct 700 lf of 42-inch outfall, w/two 72-inch manholes, 2100 lf of 36-inch storm drain w/seven 54-inch manholes, 1900 lf of 24-inch stormdrain w/six 48-inch Type-2 catch basins, and two 54-inch flow splitter manholes. Construction may require acquisition of easements along the conveyance route. The Port of Orcas will be a major beneficiary of this project and are possible contributors to the financing of this project.

This project is necessary to protect the Eastsound Swale and two small wetlands south of the Airport Wetland by bypassing increased flows to the west outfall while allowing historic flows to pass through the wetlands. This project would also divert increased flow from future development that would, otherwise tax the existing Airport stormdrainage system.

5.2 Nina Lane Stormdrain

Construct 1200 lf of 24-inch stormdrain w/one 48-inch flow splitter manhole.

This project is necessary to protect the Airport Wetland by bypassing increased flows to the west outfall while allowing historic flows to pass through the wetland.

5.3 East Airport Stormdrain: North Beach Road to Brandt's Landing Marina

Construct 1400 lf of 24-inch outfall w/five Type-2 catch basins, improve 1200 lf of open ditch and replace 600 lf of culvert.

This project is needed to provide improved conveyance for increased flows from North Beach Road to the marina outfall and establish a County easement to allow improvement and maintenance.

5.4 Mt. Baker Road from Gibson Road to Lover's Lane: Ditching and Culvert Replacement

Improve 5200 lf of roadside ditch and construct 1200 lf of new cross country ditch. Assume installation of 500 lf of 12-inch driveway culvert. The Port of Orcas will be major beneficiaries of this project and are possible contributors to the financing of this project.

This project is necessary to provide improved conveyance for increased flows on Mt. Baker Road and to avoid saturation of the road base and properties adjacent to the road. The project also includes drainage work at the County Road Maintenance Site to improve conveyance of flow to Lover's Lane.

5.5 Mountain View Street: Ditching Improvements

Improve 600 lf of roadside ditch and replace 350 lf of driveway culvert.

This project is necessary to provide improved conveyance for increased flows to avoid saturation of the road base and properties adjacent to the street. The project includes acquisition of a County easement connecting flow to the Seaview Street ditch to the west to allow improvement and maintenance.

5.6 Blanchard Road Ditching Improvements: Nina Lane to Bunny Lane

Improve 500 lf of off-road drainage ditch and replace 100 lf of 18-inch culvert.

This project is necessary to provide improved conveyance for increased flows on Blanchard Road and to relieve flooding problems in the area.

5.7 North Beach Road Ditching Improvements: Mt. Baker Road to Shady Lane;

Improve 2000 lf of roadside ditch and replace 600 lf of 12-inch driveway culvert.

This project is necessary to provide improved conveyance for increased flows along North Beach Road.

5.8 Twiggs Lane: Ditching And Culvert Replacement

Construct 1000 lf of roadside ditch and install 150 lf of 12-inch driveway culvert.

This project is necessary to mitigate erosion problems resulting from the lack of a roadside ditch.

6. BASIN 6 – NORTH BEACH

Basin Characteristics

Basin 6 is approximately 74 acres. The basin is entirely within the Eastsound UGA boundary. The basin flows fairly uniformly at about 7% slope to the north and west where a ditch and culvert along North Beach Road collect the flow and direct it to the existing 24-inch outfall at the road end. Figure 1 shows the current land use within the basin and the maximum residential densities allowed under the County Comprehensive Plan.

Basin 6 soils are a mix of low and high permeability soils (see Figure 5). The more permeable soils (SCS hydrologic soil Group A) covering about 52 acres of the basin are located in the upper portion of the basin. Due to the soil types, there may be some opportunity for infiltration systems. The lower 22 acres of the basin are composed of hydrologic soil Group D soils with low permeability and therefore greater runoff potential. There is little or no chance for infiltration systems in this area.

There are no known wetlands in Basin 6. The eastern and southern sides of the basin are mainly covered with second growth forest while the lower elevations with flatter topography are a mix of forest and single family residential development with a density of 4 DU/Ac. The 4 DU/Ac designation covers 42 of the 74 acres of the basin; much of this area has been developed. The remaining 32 acres of the basin has a land use designation of 1 unit per 5 acre. Residential developments on the small lots in this basin are not expected to trigger the threshold for detention or treatment.

Figure 10 shows the existing stormdrainage facilities in Basin 6. The estimated peak runoff for the basin is shown in Table D-1. The rate is calculated for the basin discharge at Culvert C1.

The existing 24-in. concrete outfall should be adequate to accommodate flows at full build-out in Basin 6.

Drainage Issues (Problems)

Flooding

Flooding near the intersection of Sunset Avenue and North Beach Road has been a problem due to outfall clogging and back flow during high tide. There is a house in the immediate area of the flooding.

Erosion

At present there are no known areas of significant erosion within Basin 6 but signs of erosion are present along portions of Alder, Spruce and Hemlock Streets. The potential for erosion will increase as the lots along these roads are developed.

Flow Control and Treatment

There are no existing stormwater treatment or detention systems in Basin 6.

Conveyance

The size of the existing culverts along North Beach Road are adequate for build-out of Basin 6. The existing 24-inch outfall is obstructed with beach rock that limits capacity and backs up flow. The ditching between the culverts along North Beach Road should be enlarged, which is difficult due to restricted right-of-way width. There is limited ditching along the east-west streets, so much of the runoff from these streets presently flows across private properties.

Wetlands

There are no regulated wetlands in Basin 6.

Easements

The existing system of ditches, culverts and outfall appear to be within County Road right-of-way, with the exception of an 8-inch culvert C2, which essentially serves as a second outfall for a small portion of the basin. There is no known easement for culvert C2 and the downstream conveyance route.

Recommended Improvements [Solutions]

The stormdrainage improvements recommended in Basin 6 are shown on Figure 13.

Flooding

Cleaning and installation of a debris guard should improve discharge performance of the 24-inch outfall and mitigate flooding in the vicinity of Sunset Avenue and North Beach Road.

Erosion

Roadside ditching along the roads east of North Beach Road will protect these roads from erosion.

Flow Control and Treatment

Existing flow control and treatment standards are adequate for Basin 6.

Conveyance

The ditch conveyance system along the east side of North Beach Road should be replaced with a stormdrain interceptor. The culvert system will eventually be required to extend to Mt. Baker Road to allow the widening of North Beach Road. Only the portion of this improvement from Shady Lane to Basin Outfall is covered in the discussion of Basin 6. The southern portion of this project is covered in the discussion of Basin 5.

A culvert and catch basin stormdrain system is also recommended to convey runoff from the small lots along Sunset Avenue, Alder Street, Spruce Street, Hemlock Street and Bartel Road, to the conveyance system along North Beach Road.

Wetlands

None

Easements

It does not appear that any drainage easements are needed in Basin 6.

Regional Improvements

Regional stormwater treatment for the basin does not appear to be feasible due to lack of County right-of-way.

Projects

Below is a listing, with brief descriptions, of the drainage improvement projects recommended to meet future development in Basin 3. The anticipated timing and estimated cost (in 2005 dollars) are shown in Table E-1.

6.1 North Beach Road Stormdrain: Shady Lane to Basin Outfall

Construct an outfall tidal gate and debris guard, and 1100 lf of 12-inch storm drain w/5 Type-1 catch basins and 750 lf of 18-inch stormdrain w/1 Type-1 catch basins and one 48-inch manhole.

This project is necessary to convey the increased flows to the outfall. A tide gate should be installed to prevent back flooding.

6.2 Sunset Avenue, Alder Street, Spruce Street, Hemlock Street Stormdrain

Construct 4400 lf of 12-inch stormdrain with 20 Type-1 catch basins.

This project is necessary to prevent roadside erosion and flooding of adjacent properties.

6.3 Bartel Road Stormdrain

Construct 1200 lf of 12-inch stormdrain with six Type-1 catch basins and 600 lf of ditch improvement.

The northern side of Bartel Road is planned for small lot development which could lead to driveways and culverts every 100-ft. In addition, small lot development tends to generate a lot of roadside parking. A storm drain will provide better stormwater flow, decrease maintenance, and help move the parking off or away from the roadway.

7. BASIN 7 – TERRILL BEACH

Basin Characteristics

Basin 7 is approximately 640 acres. The area included in the UGA boundary is only about 75 acres.

The basin is essentially a broad valley; the eastern side is Buck Mountain and the western side is Eastsound Village. The side slopes of Buck Mountain are characterized by steep (30%) slopes. At the valley floor, slopes flatten to about 1%.

Over 85% of the basin is outside of the Eastsound UGA boundary but since the Eastsound UGA area drains through the rural area, the entire basin is considered by this report. The portion of the basin located within the Eastsound UGA drains generally to the North to culverts along Bartel Road. Basin 7 soils are a mix of low and high permeability soils (see Figure 5). The more permeable soils (SCS hydrologic soil Group A) are located in two large areas: one area over 110 acres is located between Mt. Baker Road and Bartel Road in the western part of the basin, the other area of 22 acres crosses Terrill Beach Road in the southern part of the basin. There may be some opportunities for infiltration systems in these areas of Group A soil. The remainder of the basin is covered with soils of limited permeability (hydrologic soil Group C and D) and therefore of greater runoff potential. In these areas, there is little or no chance for infiltration systems. See soils map (Figure 5) in the appendix.

A large Class 2 wetland is located east of Terrill Beach Road near the intersection with Mt. Baker Road at the base of Buck Mountain. Runoff from approximately 230 acres flows through these 11 acres of forested wetland before exiting and flowing across Terrill Beach Road via an 18-inch concrete culvert (C5). Wetland ponds have formed at the Terrill Beach Road intersection on both sides of Mt. Baker Road and the 12-inch culvert (C6) is submerged year-round causing flooding of the roadway and the Madan property to the south of the intersection.

Runoff from about 75 acres in the northeast portion of the basin crosses Terrill Beach Road via two 12-inch culverts near Buckhorn Road. The remaining portion of the basin flows to the north and west collected by a series of road ditches and culverts and conveyed to the valley north of Mt. Baker Road. Here cross-country ditches and natural swales convey the flow into two 24-inch culverts (C1) at Bartel Road that serve as the basin outlet. At this point all of the flow is combined and continues to pass between two residences and into a wetland at the shoreline. A seasonal pond forms at, and appears to seep through, the gravel beach berm to President Channel.

The eastern side of Basin 7 is covered with second growth forest. The lower and flatter elevation near the center of the basin is a mix of forest and pasture. There are about 110 acres of open pasture in the center of the basin.

Residential development is scattered throughout the basin with the greatest

residential concentration along the north shoreline. There is a small amount of industrial/commercial development along Mt. Baker Road, the boundary of the Eastsound UGA.

Figure 1 shows the current land use within the basin and the maximum residential densities allowed under the County Comprehensive Plan. The land use for Basin 7 outside of the UGA boundary is Rural Farm Forest to the south, Forest Resource in the north and residential in the west. Inside the UGA the land use is residential and Service Park. The residential land use densities vary from 1 DU/5 Ac to 1 DU/20 Ac outside the UGA and from 2 to 12 DU/Ac within the UGA.

The existing stormdrainage facilities in Basin 7 are shown on Figure 14. The estimated peak runoff rates for the Basin are shown in Table D-1. The rates were calculated for the basin discharge at Culvert (C1).

A 60-inch outfall is recommended to accommodate the future peak runoff flows anticipated in Basin 7.

Drainage Issues (Problems)

Flooding

Seasonal flooding is currently a problem in two areas and is expected to increase as flows increase with added development. The first of these areas is at the intersection of Terrill Beach and Mt. Baker Roads where the inside lane of the banked turn (SW corner of the intersection) is frequently flooded with water during the wet season. The property owner with a house to the south of the intersection has notified the Public Works Department about increased flooding on his property.

The second area is to the west of Terrill Beach Road near Bartel Road where flows back up and cause flooding of properties near the shoreline and to the south. A property owner in the area recently initiated legal action against San Juan County because of increased flooding of the owner's property south of Bartel Road. This action resulted in the addition of the second 24-inch culvert at Bartel Road and the purchase of a conservation easement by the San Juan County Land Bank. Two or three homes are located near the shoreline wetland which would likely be affected by increased flooding in the area. To mitigate existing and anticipated flooding conditions in this basin, it is recommended that Type-3 flow control standards as defined in the King County Surface Water Design Manual be applied to Basin 7 until the lowland conveyance improvements recommended below are completed.

Erosion

There are no significant erosion problems within Basin 7. It is expected however that runoff down the steep north side of Buck Mountain from increased development may result in erosion problems. Channels and road ditches should be checked periodically so that improvements can be made as soon as problems arise.

Flow Control and Treatment

There are no existing stormwater treatment or detention systems in Basin 7.

Conveyance

Based on the size of the contributing area it is expected that the culvert along Terrill Beach Road at Mt. Baker Road will need to be enlarged or added to. It is expected that the open ditch conveyances along Mt. Baker Road will need enlarging in order to avoid flooding and saturation of adjacent properties along the routes.

Wetlands

Increased flow to existing regulated wetlands is generally not allowed by the Stormwater Management Manual. The Stormwater Management Manual precludes sending increased flows to existing wetlands unless a wetland study determines that the wetlands have capacity to receive increased flows without causing adverse affects on the wetland. A preliminary assessment by Herrera Environmental Consultants suggests that the wetlands in Basin 7 should be protected by upstream treatment and flow control. Increased flows should bypass the wetlands to avoid degradation of the wetland environment. Historic flows to the wetlands should be maintained.

Easements

There are no County drainage easements in the Basin. The County road rights-of-way are used to convey stormwater. The flow path crosses private properties north of Mount Baker Road to the west of Terrill Beach Road. Without drainage easements in place the County cannot maintain these drainage channels and erosion and flooding may result. This could be cause for future litigation as flows increase.

Recommended Improvements (Solutions)

The storm drainage improvements recommended in Basin 7 are shown on Figure 15.

Flow Control and Treatment

Current treatment standards are adequate for Basin 7. However, detention should be required to mitigate wetland impacts and to reduce flooding problems. Developers may elect to fund improvements to the County conveyance system in lieu of constructing on-site detention. Properties that flow into the wetlands will be required to maintain detention even after conveyance improvements have been made.

Conveyance

A stormdrain culvert system is necessary between Buckhorn Road and Terrill Beach Road in order to provide bypass flows around the wetland areas and protect these resources.

Wetlands

It is recommended that a restoration and enhancement project be developed to improve habitat while increasing the treatment and storage capacity of the Terrill Beach Road wetlands. The project would include reconfiguring existing ditches that contribute to or are located within the wetlands to provide for more storage and treatment.

Easements

Drainage easements are necessary to develop a wetland enhancement project. Easements may be necessary from Mt. Baker Road to the north shoreline.

Projects

Below is a listing, with brief descriptions, of the drainage improvement projects recommended to meet future development in Basin 3. The anticipated timing and estimated cost (in 2005 dollars) are given in Table E-1.

7.1 Terrill Beach Road Stormdrain and Outfall

Construct 200 lf of 60-inch Outfall with tide gate, 600 lf of 60-inch stormdrain with a 72-inch manhole, 1000 lf of 48-inch stormdrain with one 60-inch manhole and two 72-inch flow splitter manholes.

This project is necessary to safely convey and bypass increased flows around the lower wetland areas. Project would relieve flooding problems near Bartel Road.

7.2 Terrill Beach Wetlands Enhancement

Develop a restoration and enhancement project to improve habitat while increasing the wetland treatment and storage capacity.

This project is necessary to mitigate impacts to the wetland systems.

7.3 Terrill Beach Road and Mt. Baker Road Roadside Ditch Improvements

Construct 4800 lf of ditch improvement and replacement of 200 lf of 12-inch culvert.

This project is necessary to improve conveyance and prevent saturation of road base and flooding of roadway and adjacent properties.

8. BASIN 8 – SHIP BAY

Basin Characteristics

Basin 8 is approximately 264 acres. The area is outside of the UGA boundary, but since it drains through the southeast portion of the UGA it is included in this study.

The eastern upper portion of Basin 8 is located on the west slopes of Buck Mountain and drains westerly toward Olga Road where it is conveyed under the road via a 24-inch culvert. Basin land cover along the West slope of Buck Mountain consists of second growth forest with some small scattered open areas composed mostly of rock outcrops. Land slopes are highly variable with steep ridges and slopes which often exceed 30 percent. The lower part of the basin just east of Olga Road includes more open meadows with flatter land slopes of approximately 5 to 10%.

Runoff from the basin is collected by the road ditches traversing the Buck Mountain flank and conveyed to cross culverts such as the 12-inch culvert on Gafford Lane. Basin runoff is eventually collected by the road ditch along the East side of Olga Road. This ditch conveys the runoff to a 24-inch culvert (C2) crossing Olga Road just south of Yellow Brick Road. An open ditch conveys the discharge to the top of the 60-ft high bank where it enters a 30-inch culvert and outfall. The outfall culvert has deteriorated and broken apart allowing the flow to erode a significant channel down the slope. The basin discharges into Ship Bay.

The soils covering Basin 8 are classified as primarily Roche and Pickett rock outcrop soils. Figure 5 is a map showing the soils distribution within the Eastsound UGA. The upper three quarters of the basin is covered by Pickett soil series which belong to SCS hydrologic soils Group C. The permeability of Pickett soil is moderate with slow to medium runoff. In areas of rock outcrop runoff is rapid to very rapid and the soil has a high erosion hazard.

The soils in the lower part of the basin are composed of soils from Roche and Bow series which belong to hydrologic soils Group D. These soils are slow to medium with a moderate erosion hazard. Thus, basin soils leave little opportunity for development of infiltration systems. Development within the basin is sparse composed mostly of residential development on the less steep slopes of Buck Mountain and the flatter slopes east of Olga Road.

Land use throughout the basin is designated as Rural Farm Forest with a residential density of 1 DU/ 5 acres.

The estimated peak rates of runoff for Basin 8 are shown in Table D-1. The rate is calculated for the basin discharge at culvert C2.

A new culvert is currently required to replace the existing badly deteriorated culvert to arrest erosion of the shoreline bank. A 42-inch or 48-inch culvert will be needed to accommodate anticipated future flows from Basin 6. Additional hydrologic analysis is

recommended to properly size the new culvert.

Drainage Issues (Problems)

Flooding

There are no reported flooding problems in Basin 8. However, it is anticipated that the existing pond near the top of the bank west of the Ship Bay Inn could be a location for a flooding problem with increased flows due to development in the basin.

Erosion

The 30-inch outfall culvert is broken and bank erosion is occurring. It is an old County road culvert which used to flow to the bottom of the bank but has broken and left only the top 20-foot section. The flow over the bank is causing significant erosion and channeling down the 60-foot high slope. The Ship Bay Inn is located about 50' east of the outfall location and we would expect the building would be eventually threatened by the bank erosion if this condition is not corrected. To mitigate existing and anticipated bank erosion conditions in Basin 8, it is recommended that Type 2 flow control standards as defined in the King County Surface Water Design Manual be applied to Basin 8 until a new outfall can be constructed.

Flow Control and Treatment

There are no existing stormwater treatment or detention systems in Basin 8. However a large pond was built on a property on Yellow Brick Road upstream of the 24-inch culvert (C2).

Conveyance

Based on the size of the contributing area, we would anticipate that the 24-inch culvert (C2) at Olga Road and the 30-inch outfall are undersized for build-out conditions. In addition, the surface conveyance system downstream of Olga Road requires improvement to adequately handle present as well as future flows.

Wetlands

We are not aware of any wetlands in Basin 8.

Easements

There are no County drainage easements in Basin 8. The County road rights-of-way are used to convey stormwater. Olga Road right-of-way provides a County flow path that feeds culvert C2. Current flow paths downstream of Olga Road cross private properties and do not follow drainage easements. Without drainage easements in place the County cannot maintain the channels and erosion and flooding may result. This could be cause for future litigation as flows increase.

Recommended Improvements (Solutions)

The stormdrainage improvements proposed in Basin 8 are shown by Figure 17.

Erosion

The existing 30-inch outfall should be replaced with a 48-inch outfall which would carry the flows to the bottom of the bank, reducing bank erosion considerably. Energy dissipation would be necessary at the outfall to protect the beach from erosion.

Flow Control and Treatment

It is recommended that an enhanced treatment requirement should be applied to Basin 8 due to the outflow into East Sound. The threshold for triggering the treatment requirements should also be lowered in Basin 8 from 5000 SF pollution generating impervious surface to 1000 SF pollution generating impervious surface.

Detention should be required in Basin 8 until adequate conveyance improvements have been made downstream of the development. Conveyance improvements to the County stormdrain system may be funded by developers in lieu of providing on-site detention

Based on the size of the contributing area, the 24-inch culvert C2 at Olga Road and the 30-inch outfall should be replaced or added to so they will be able to convey increased flow from future development. A new 48-inch outfall structure is needed. It must extend down the 60-foot bank and will completely replace the failing 30-inch outfall. The flow energy will need to be dissipated at the beach level.

Easements

Drainage easements should be acquired by the County along the conveyance route west of Olga Road so that it can construct and maintain needed improvements. The County may consider acquiring the existing lot containing the outfall (TPN 271343003) so that improvements can be made.

Projects

Below is a listing, with brief descriptions, of the drainage improvement projects recommended to meet future development in Basin 8. The anticipated timing and estimated cost (in 2005 dollars) are given in Table E-1.

8.1 Ship Bay Outfall Improvement

Construct 200 lf of 48-inch stormwater outfall anchored to 60-ft high shoreline bluff and a riprap energy dissipater at discharge end of outfall. Project includes acquisition of the lot containing the outfall and connecting conveyance ditch.

Project is necessary to provide conveyance of increased flows down to the beach and avoid significant shoreline erosion which is currently occurring.

8.2 Olga Road Ditch Improvements and Culvert Replacement

Construct 450-lf of ditch improvements and supplement the existing 24-inch culvert with addition of a new 42-inch culvert.

Project is necessary to convey increased flows across Olga Road and to the top of the bank. The project will require drainage easements for improvement and maintenance of open ditches.

9. BASIN 9 – MONTGOMERY LANE

Basin Characteristics

Basin 9 is approximately 24 acres, all within the Eastsound UGA. Surface runoff from the basin is generally northeast to southwest towards Ship Bay through culverts which pass under Montgomery Lane. The basin slopes towards the southwest at a relatively constant slope of approximately 7 percent.

Basin 9 soils are a mix of low and high permeability soils (see Figure 5). The more permeable Indianola soils (SCS hydrologic soil group A) are located in a 9-acre triangular area on the North side of the basin. There may be some opportunity for infiltration systems in these areas. The remainder of the watershed is composed of Roche and Bow series soils which are classified by the SCS as hydrologic soil Group D soils with limited permeability and therefore greater runoff potential. There is little or no chance for infiltration systems in these areas.

Surface runoff within the basin is collected by a series of 8-inch culverts which cross Montgomery Lane and drain to the shoreline in three locations. Runoff from the basin leaves the basin through culverts C1 and C2. The principal basin outlet is considered to be the northern most culvert (C1).

Land cover in the basin is mixed second growth forest and grassland meadow. Development within the basin is distributed on either side of Crescent Beach Drive, along the West side of Olga Road and along both sides of Montgomery Lane. Most of the commercial development in the basin is located on the north side of Crescent Beach Drive.

Figure 1 shows the current land use and the maximum residential densities allowed in the UGA under the County Comprehensive Plan. The land use plan for Basin 9 includes 6 acres of Service Park on the north side of Crescent Beach Drive and 18 acres classified as residential (2 DU/Ac) south of Crescent Beach Drive.

The existing stormdrainage facilities in Basin 9 are shown by Figure 16 and the estimated runoff for the basin is shown in Table D-1. The peak runoff rates shown are calculated for the primary basin outlet at culvert C1.

An 18-inch culvert will be required to pass the future flows anticipated from this basin. Additional hydrologic analysis will be required prior to design and construction of a new discharge culvert. Combining the outfalls for Basins 9 and 10 appears logical. See discussion of culvert sizing below in Basin 10 – Crescent Beach.

Drainage Issues (Problems)

Flooding

There are no reports of flooding in Basin 9.

Erosion

Bank erosion problems exist at the three outfall locations on Montgomery Lane and threaten several existing homes in the area. The concentrated flow has eroded large holes on the top of the bluff and large gullies on the face of the bluff. To mitigate existing and anticipated bank erosion conditions in this basin, it is recommended that Type-2 flow control standards as defined in the King County Surface Water Design Manual be applied to Basin 9 until conveyance improvements are completed.

Flow Control and Treatment

There is one known existing stormwater treatment and detention system in Basin 9. It is a combined wet pond/detention pond recently completed to serve the Inter-Island Petroleum Gas Station and Convenience Store at the intersection of Crescent Beach Road and Terrill Beach Road. Infiltration drywells are used to infiltrate the roof runoff. An oil/water separator is used for spill control at the covered fueling area.

Conveyance

The existing culverts on Montgomery Lane direct upland flow into three locations along the eroding bluff. Between the road and the edge of the bluff the flow is carried through a combination of open ditches and old culverts remaining from the old County road formerly located along the top of the bank. The conveyance between Montgomery Lane and the top of the bank traverses private lots and interferes with existing and planned building construction in the area.

Wetlands

There are no regulated wetlands in Basin 9.

Easements

There are no County drainage easements in Basin 9. The County road rights-of-way are used to convey stormwater. Crescent Beach Road and Montgomery Lane rights-of-way provide the flow path to Ship Bay. Current flow paths downstream of Montgomery Lane cross private properties. Without drainage easements in place the County cannot maintain the channels and erosion and flooding may result. This could be cause for future litigation as flows increase.

Recommended projects (Solutions)

The facility improvements proposed in Basin 9 are shown by Figure 18.

Regional Improvements

A regional biofiltration swale should be considered for construction along the east side of Montgomery Lane to provide both conveyance and treatment of upstream runoff. The swale would also provide conveyance, intercepting upstream flows prior to the eroding bank.

Erosion

The existing culverts directing flow to the eroding bank should be abandoned and flow directed to the north and collected along with the Basin 8 runoff in a new outfall at the beach.

Flow Control and Treatment

It is recommended that an enhanced treatment requirement should be applied to Basin 9 due to the outflow into East Sound. The threshold for triggering the treatment requirements should also be lowered in Basin 9 from 5000 SF pollution generating impervious surface to 1000 SF pollution generating impervious surface.

Detention should be required in Basin 9 until adequate conveyance improvements have been made downstream of the development.

Easements

Drainage easements should be acquired by the County to convey the stormwater to Ship Bay and provide for construction of a biofiltration swale.

Projects

Below is a listing, with brief descriptions, of the drainage improvement projects recommended to meet future development in Basin 3. The anticipated timing and estimated cost (in 2005 dollars) are given in Table E-1.

9.1 Montgomery Lane to Crescent Beach Stormdrain and Outfall

Construct 500 lf of 18-inch stormdrain, one 48-inch manhole, one 72-inch manhole, a field inlet structure and 100 lf of 48-inch outfall with tidal gate.

This project is necessary to provide conveyance of increase flows to the shoreline and avoid significant shoreline location which is currently occurring.

9.2 Montgomery Lane Conveyance Improvement and Biofiltration Swale

Construct 1000 lf of biofiltration swale including three Type-1 catch basins constructed over a 12-inch stormdrain.

This project is necessary to provide treatment for road and upland area runoff and to intercept and direct runoff away from the eroding shoreline bank.

10. BASIN 10 – CRESCENT BEACH

Basin Characteristics

Basin 10 includes approximately 203 acres located north of Ship Bay. All but 12 acres of Basin 10 are within the current UGA boundary. Drainage direction in the basin is variable with the east side of the basin draining west across Terrill Beach Road via a 12-inch culvert (C4) towards the center of the basin. The north and west sides of the basin drain to the south toward the basin outlet. The only structural outlet to the basin consists of a 12-inch culvert (C1) crossing Crescent Beach Drive and discharging to Ship Bay. A small area along the west side of Madrona Street also drains via culverts C2 and C3 from the southwest corner of the basin to the outlet.

The topography of the basin forms a saddle with higher terrain on the east and west sides and a low, poorly defined divide as the north boundary. The center of the basin slopes at about 2 to 3% to the south. The steepest slopes are on the farthest east edge of the basin along the foothills of Buck Mountain. In this area steep slopes of 40% are common. The topography flattens west of Terrill Beach Road with 8 to 10% slopes. The west side of the basin has slopes of about 8% in the northwest corner which flatten to approximately 1 to 3% within the low wetland area upstream from the outlet.

The soils in Basin 10 are a mix of low and high permeability soils (see Figure 5). The more permeable Indianola soils (SCS hydrologic soil Group A) are located in a wide band of approximately 22 acres located along Terrill Beach Road. There may be some opportunity for infiltration systems in this area. The remainder of the basin is composed of Roche, Norma, Neptune and Bow series soils which are hydrologic soil Group D soils with limited permeability and therefore greater runoff potential. There is little or no chance for infiltration systems in these areas.

Runoff from the high terrain to the east of Terrill Beach crosses the road at culvert C4 and proceeds west along the north side of Crescent Beach Drive to the outlet at culvert C1. Runoff from the south end of Madrona Street at the west side of the basin flows south along the west side of the street and across Madrona Street via culvert C2 to the outlet. Culverts C1 through C4 in the basin are all 12-inch.

Land cover in the basin is mixed second growth forest, wetland and grassland meadow. Development within the basin is light with most of the residential and commercial development. Development in the basin is fairly well concentrated in the vicinity of Crescent Beach Drive and Terrill Beach Road.

Most of the basin with the exception of the area east of Terrill Beach Road is within the UGA boundary. The 12 acres outside the UGA boundary is designated Rural Farm Forest at a density of 1 DU/5 acres. Within the UGA portion of the basin the most prevalent land use designation is single family residential development. 87 acres of residential land use at a density of 4 to 12 DU/Ac is specified in the central part of the

basin, 28 acres of residential land use at 2DU/Ac is specified on the east side of the basin and additional area at 2DU/Ac is set aside in the southwest corner and along the west border of the basin. Commercial land use is designated at the far west side of the basin, in the Village Commercial area along Madrona Street and Service Park zones of about 5 acres each are located to the north and south of the residential area.

Figure 16 shows the existing stormdrainage facilities in Basin 10. The estimated peak runoff rates for Basin 10 are shown in Table D-1. The peak runoff flow rates are calculated for the basin discharge at culvert C1. See Table D-1.

It is estimated that a 42-inch culvert will be required to replace the 12-inch culvert to accommodate the future flows from Basin 10. Additional hydrologic analysis will be required to size this culvert at the time of installation.

It is recommended that an additional outlet be constructed to jointly serve Basins 9 and 10 as described below. Table D-1 displays the future peak flows expected from each basin and the peak flows expected from commingling the discharge of the two basins.

A 48-inch culvert would be required to carry the anticipated future flows that would be directed to this culvert. Additional hydrologic analysis is recommended to properly size this culvert at the time of installation. A single improved outfall would be more effective than two separate outfalls and design and construction costs should be significantly less.

Drainage Issues (Problems)

Flooding

Seasonal flooding occurs along the western and southern edges of the Crescent Beach Wetland where two or three houses have been sited within the wetland, an existing condition, not without problems. The flooding of the Crescent Beach Wetland area is reportedly due to frequent clogging of the 12-inch outfall culvert, which has no tide gate structure. The Public Works Department has repeatedly responded to complaints of a flooded septic system in the area. When the culvert is plugged water builds up behind the culvert and when the culvert is unplugged a channel is often eroded in the sandy beach.

Flooding also occurs in a residential area on the flat dome west of Terrill Beach Road along Bracken Fern Lane. To mitigate existing and anticipated flooding conditions in Basin 10, it is recommended that Type-3 flow control standards as defined in the King County Surface Water Design Manual be applied to development in Basin 10 until downstream conveyance improvements are completed.

Erosion

There are no significant locations of erosion in Basin 10.

Flow Control and Treatment

There are no stormwater treatment or detention systems in Basin 10.

Conveyance

The lack of a conveyance system near Bracken Fern Lane contributes to the flooding problems in that area.

Wetlands

Increased flow to existing regulated wetlands is generally not allowed by the Stormwater Management Manual. The Stormwater Management Manual precludes sending increased flows to existing wetlands unless specific wetland studies determine that the wetlands have capacity to receive increased flows without causing adverse affects on the wetland. A preliminary wetland assessment by Herrera Environmental Consultants suggests that the primary wetlands in Basin 10 should be protected by upstream treatment and flow control. If increased flows are anticipated they should bypass the wetlands to avoid degradation of the wetland environment. Historic flows to the wetlands should be maintained.

Easements

There are no County drainage easements in this drainage basin. The San Juan County Land Bank owns the "Buck Property" which includes much of the wetland areas. Without drainage easements in place the County cannot maintain the channels and erosion and flooding may result. This could be cause for future litigation as flows increase.

Recommended Projects (Solutions)

The proposed storm drainage improvements for Basin 10 are shown by Figure 19.

Regional Improvements

The development of the "Buck Property" may allow a bypass system to be developed that would divert increased flows around the Crescent Beach Wetland. This system could intercept upstream flows and provide a regional solution for conveyance.

Flow Control and Treatment

It is recommended that an enhanced treatment requirement be applied to Basin 10 due to the outflow into East Sound. The threshold for triggering the treatment requirements should be lowered in Basin 10 from 5000 SF pollution generating impervious surface to 1000 SF pollution generating impervious surface.

Detention should be required in Basin 10 until adequate conveyance improvements (including wetlands bypass) have been made downstream of the development. Conveyance improvements to the County stormdrain system may be made by

developers in lieu of providing on-site detention.

Conveyance

A ditch and culvert system should be developed to relieve flooding conditions near Bracken Fern Lane and allow increased future flows. A flow splitter would maintain existing flows to the northern wetland while diverting increased flows to the new outfall at Crescent Beach.

Wetlands

To mitigate impacts to the wetlands from future development, the development of two intercepting stormdrain systems with flow splitters is recommended. In order to avoid rising water levels in the Crescent Beach Wetland an 18-in overflow outfall should be added with a flow line elevation determined on the basis of a wetland impact analysis. The overflow would prevent flooding and degradation of the wetland by releasing flow that would otherwise be unavoidably retained by the wetland.

Easements

Drainage easements will be required to construct and maintain the new stormdrain systems.

Projects

Below is a listing, with brief descriptions, of the drainage improvement projects recommended to meet future development in Basin 3. The anticipated timing and estimated cost (in 2005 dollars) are given in Table E-1.

10.1 Buck Property Stormdrain, With Flow Splitter

Construct 600 lf of 18-inch stormdrain with three 48-inch manholes (one to be a flow splitter) and 1100 lf of 24-inch stormdrain with two 48-inch manholes. The 72-inch manhole at the juncture where Basins 9 and 10 commingle and the downstream outfall are included in Basin 9 projects.

Project is necessary to protect Crescent Beach Wetland by bypassing increased flows to the beach while maintaining historic flows to the wetland.

10.2 Bracken Fern Lane Stormdrain, With Flow Splitter

Construct 1200 lf of 36-inch stormdrain w/four 54-inch manholes (one to be a flow splitter), 650 lf of 24-inch stormdrain, 1100 lf of 18-inch stormdrain and 800 lf of 12-inch stormdrain with nine 48-inch manholes.

Project is necessary to protect existing wetland by bypassing increased flows to the beach while maintaining historic flows to the wetland. The project would relieve flooding problems near Bracken Fern Lane.

10.3 Crescent Beach Wetland Overflow Outfall

Construct 200 lf of 18-inch outfall with tidal gate.

Project is necessary to protect the Crescent Beach Wetland from inundation from clogging outfall and increased flows in the basin. The project would also reduce maintenance problems by preventing clogging of the outfall with tidal gate.

E. STORMWATER IMPROVEMENT PLAN

1. BACKGROUND

In this section the capital improvement projects and science based management programs introduced in Sections C and D are assigned costs and priorities and the projects are integrated into a long-range stormwater improvement plan for the Eastsound UGA.

Table E-1 is a Stormwater Capital Improvement Plan (CIP) covering the 40-year period from 2005 until 2045. Table E-2 shows recommended changes to current County regulations designed to protect sensitive wetland and shoreline systems as the Eastsound UGA develops. Displays of the recommended improvements have been presented earlier in the Basin Analysis section of this report.

The Appendix following this section provides line item cost estimates of each CIP project and the assumptions used in generating the estimates.

2. STORMWATER IMPROVEMENT PLAN

The Stormwater Improvement Plan presented by Tables E-1 and E-2 consists of improvements that address the following issues:

- Outfall and conveyance improvements that affect large areas.
- Wetland preservation strategies including wetland bypasses that will limit increased flows to wetlands
- Treatment systems that will improve the quality of stormwater runoff discharged to East Sound and Category 1 wetlands in Basins 5 and 10.
- Selected projects that mitigate flooding and erosion in local areas.
- Monitoring programs that will provide baseline data on how area wetlands function and provide feedback on the health of area wetlands and receiving waters.

As the Eastsound UGA develops the amount of impervious area will grow and the rate of stormwater runoff will increase. Environmental laws do not allow increased rates of runoff to be discharged to wetlands without first understanding the impact. Thus, extensive outfall and conveyance improvements, including a number of wetland bypass systems, will likely be required in the Eastsound UGA to accommodate future growth.

The absence of adequate downstream conveyance capacity may cause flooding and erosion and a possible moratorium on upstream development. The construction of outfall and conveyance capacity that affect large areas is a high priority in the following Improvement Plan.

The construction of necessary conveyance capacity may not keep up with the increase in runoff in some areas of the Eastsound UGA so this Plan recommends

lowering the threshold requirements for detention in these areas (Table E-2) until the necessary downstream improvements are in place. Ideally, this restriction should be applied on a site specific basis. In areas where Low Impact Development (LID) site development is effective, this recommendation can prove beneficial and lead to sizeable County cost savings. However, where LID site development is not effective the result could be an undesirable proliferation of numerous, small, privately maintained flow control systems. In these areas the options are to restrict development or to accelerate construction of the downstream stormwater facilities.

The plan also recommends lowering thresholds for on-site treatment in basins draining to East Sound or Category 1 Wetlands in an effort to protect the health of these sensitive and valuable natural systems.

3. PRIORITIZATION

Treating the runoff that flows to East Sound and the Category 1 Wetlands was given the highest priority in developing the Stormwater Improvement Plan. Second priority was given to outfall and regional conveyance bottlenecks, particularly those projects that would relieve the condition calling for lowering of the threshold requirement for on-site detention. Basins perceived as having the potential for the most intense near-term development were also given a close consideration. Lowest priority was given to projects considered of limited local benefit. These projects could be built at any time with enough private interest.

Project list 2005-2009

The project section in each basin write-up provides brief descriptions of the projects listed in Table E-1. Many of these projects will not be necessary for a number of years and may undergo modification or even replacement as time passes. There are however, a number of stormwater projects in the Eastsound UGA that are overdue and should be constructed as soon as financially feasible. These projects are listed on Table E-1 as "Anticipated Projects 2005-2009". The Public Works Department has completed preliminary studies on each of these projects in the 2005-2009 group so more complete descriptions of these projects are possible and are given here.

Design of a stormwater treatment facility for the "Mount Property" and acquiring the right-of-way to construct conveyance from the "Mount Property" to the 54-inch outfall adjacent to Viewpoint Park is critical. The owner of the Outlook Inn, located at the North terminus of the 54-inch outfall, has a permit to construct a building in the path of an essential link in the conveyance system from the "Mount Property" to the outfall. Construction of the building is planned for 2006.

The preliminary design for a 48-inch connector to the 54-inch outfall has been completed. A shorelines permit application and a wetland study needed for the project are in progress. Verbal negotiations with two private property owners for the needed right-of way have begun on a positive note.

The County has an obligation tied to partial funding for the project from the owner of the Orcas Athletic Club. A second developer (New Market Square) has indicated a desire to participate financially in exchange for a portion of the resultant treatment and conveyance capacity.

The Rose Street Improvements (North Beach Road to Rose Street) are listed for early consideration because this project is a long outstanding obligation of the County to complete street-front improvements along of Rose Street.

A habitat and biological assessment of the hydraulic capacity of the Eastsound Swale should be started as soon as possible. Current regulations state that Category 2 Wetlands, such as the Eastsound Swale generally should be protected from additional stormwater inflow but they may have additional hydraulic capacity and can be enhanced if supported by a wetlands habitat and biology assessment.

Regulations prohibit an increase in the amount of runoff discharged to the Eastsound Swale until a wetland assessment determines that the increase in flow is beneficial to the wetland. This requirement is a strong deterrent to additional development in the upper portion of Basin 4 as the options for development approval are on-site stormwater retention, construction of a wetland bypass from Enchanted Forest Road to the outlet of Basin 4, or an environmental assessment determining that additional runoff to the wetland is beneficial. Preliminary estimates indicate that nearly 2000 linear feet of 42-in. bypass line will be required to route increased runoff around the Eastsound Swale if it is determined that it has no additional hydraulic capacity.

The Ship Bay Outfall Improvement (8.1) is primarily replacement of a failed outfall located on a steep 60-foot high bank. The failure has resulted in significant bank erosion that could eventually threaten the Ship Bay Inn if ignored. It is anticipated that the owners of the Ship Bay Inn and their neighbors to the south may contribute right-of way and participate in correcting this failure.

A project to install stormdrains and make improvements to the streets in this fairly densely populated North Beach tract has been on the boards for a number of years. Preliminary planning, including an aerial topographic survey were completed in 2002.

Monitoring Program

Information regarding the seasonal water levels and flow rates in the County wetlands is non-existent. This information is needed to understand the existing hydrologic patterns within a wetland and be able to project and predict future conditions and understand the impact of increased flow to the system. The data gathered will help the County estimate the hydraulic capacity of the system for storage, treatment and habitat.

It is recommended that the County work with a wetland biologist to set up a water level and stream gauge network in selected wetlands within the Eastsound UGA and sponsor and assist a team of volunteers to monitor the systems and take measurements on a monthly basis. The data would allow the Public Works Department to make better decisions regarding the planning of Wetland bypasses and the design of flow splitters that allocate flow between wetland discharge and stormdrain conveyance.

**Table E-1
EASTSOUND UGA STORMWATER IMPROVEMENT PLAN
CIP PROJECT LIST**

Project Number	Project Name	Estimated Cost (2005 Dollars)
ANTICIPATED PROJECTS 2005-2009		
1.3	Rose Street Storm Drain: Madrona Street to Prune Alley	\$ 123,000
4.1	"Mount Property" to Main Street Storm Drain	\$ 168,000
4.2	"Mount Property " Stormwater Treatment Facility	\$ 155,000
4.3	"A" Street to "Mount Property" Storm Drain w/Flow Splitter	\$ 75,000
4.4	Eastsound Swale Bypass Storm Drain	\$ 667,000
4.7	Eastsound Swale Wetland Assessment and Enhancement	\$ -
6.2a	Spruce, Alder and Hemlock Streets Storm Drain	\$ 320,000
8.1	Ship Bay Outfall Improvement	\$ 203,000
ESTIMATED TOTAL PROJECT COSTS 2005-2009		\$ 1,711,000
ANTICIPATED PROJECTS 2010-2014		
1.1	Prune Alley to "Mount Property" Storm Drain	\$ 59,000
1.2	Fern Street Storm Drain: Madrona Street to Prune Alley	\$ 128,000
1.4	Pine Street Storm Drain	\$ 68,000
1.5	School Road Storm Drain: Madrona Street to Prune Alley	\$ 84,000
2.1	Lover's Lane Storm Drain: Greer Lane to Waterfront Park	\$ 47,000
5.1	West Airport Storm Drain: Lovers Lane to North Shore	\$ 451,000
5.2	Nina Lane Storm Drain	\$ 169,000
8.2	Olga Road and Ship Bay Ditch Improvements	\$ 50,000
9.1	Montgomery Lane to Crescent Beach Storm Drain	\$ 150,000
9.2	Montgomery Lane Conveyance Improvement	\$ 95,000
ESTIMATED TOTAL PROJECT COSTS 2010-2014		\$ 1,301,000
ANTICIPATED PROJECTS 2015-2019		
1.6	Market Street Storm Drain Improvements	\$ 59,000
3.1	Orcas Road Storm Drain and Outfall: Gailey's First Add.	\$ 91,000
5.4	Mt. Baker Road Ditch Improv: Gibson Road to Lover's Lane	\$ 102,000
7.1	Terrill Beach Road Storm Drain and Outfall	\$ 954,000
7.2	Terrill Beach Wetland Assessment and Enhancement	\$ -
7.3	Terrill Beach Road and Mt. Baker Road Ditch Improvements	\$ 71,000
ESTIMATED TOTAL PROJECT COSTS 2015-2019		\$ 1,277,000
ANTICIPATED PROJECTS 2020-2024		
4.5	Enchanted Forest Road Improvements	\$ 86,000
4.6	Fishing Bay Outfall Erosion Protection	\$ 12,000
5.3	East Airport Storm Drain: North Beach Road to Marina	\$ 497,000
5.5	Mountain View Street Ditch Improvements	\$ 22,000
5.6	Blanchard Road Ditch Improvements: Nina Lane to Bunny Lane	\$ 13,000
5.7	North Beach Road Ditch Improvements: to Shady Lane	\$ 50,000
6.1	North Beach Road Storm Drain	\$ 217,000
10.1	Buck Property Storm Drain	\$ 229,000
10.2	Bracken Fern Lane Storm Drain	\$ 587,000
10.3	Crescent Beach Overflow Outfall	\$ 48,000
10.4	Crescent Beach Wetland Enhancement	\$ -
ESTIMATED TOTAL PROJECT COSTS 2020-2024		\$ 1,761,000
ANTICIPATED PROJECTS 2025-2044		
2.2	Greer Lane Roadside Ditch Improvements	\$ 26,000
5.8	Twiggs Lane Ditch Improvements	\$ 20,000
6.2b	Sunset Avenue Storm Drain	\$ 124,000
6.3	Bartel Street Storm Drain	\$ 123,000
ESTIMATED TOTAL PROJECT COSTS 2025-2044		\$ 293,000

Total of All Projects in 2005 Dollars

\$ 6,343,000

**Table E-2
Recommended Changes in Current Standards**

Basin	Flow Control	Treatment	Comment
1	Detain runoff pending completion of Project 4.1	Reduce threshold for treatment to 1000 SF	Discharge to East Sound
2	Detain runoff pending completion of Project 2.1	Reduce threshold for treatment to 1000 SF	Discharge to East Sound
3	Detain runoff pending completion of Project 3.1	Reduce threshold for treatment to 1000 SF	Discharge to East Sound
4	Detain runoff until downstream conveyance including wetlands bypass is completed	Reduce threshold for treatment to 1000 SF	Basin contains Class 2 wetlands and discharges to East Sound
5	Require KCSWDM* Type 3 flow control (see notes)	Reduce threshold for treatment to 1000 SF	Basin contains Class 1 wetlands
6	Current Standards are adequate	Current Standards are adequate	Current Standards are adequate
7	Detain runoff in area upstream of wetlands and areas of flooding	Current Standards are adequate	Basin contains Class 2 wetlands
8	Detain runoff pending completion of Basin outfall	Reduce threshold for treatment to 1000 SF	Discharge to East Sound
9	Detain runoff pending completion of Project 9.1	Reduce threshold for treatment to 1000 SF	Discharge to East Sound
10	Detain runoff until downstream conveyance including wetlands bypass is completed	Reduce threshold for treatment to 1000 SF	Basin contains Class 1 and Class 2 wetlands and discharges to East Sound

* KCSWDM: King County Surface Water Design Manual

Table E-2 summarizes recommended basin specific changes to the stormwater detention and treatment standards as set forth in the San Juan County Uniform Development Code. An enhancement of stormwater treatment standards are recommended for basins that discharge to either East Sound or a Class 1 wetland.

If current standards are changed as recommended, most basins will require onsite detention or retention for new development before the larger basin-wide projects are built downstream. Although this strategy would limit flow increases, the proliferation of scattered, privately operated and maintained stormwater facilities may not be desirable. Many facilities, particularly detention facilities, would become unnecessary when downstream improvements are completed thus, if feasible, it is generally wise to accelerate the construction of the larger, basin-wide solutions and minimize the number of on-site facilities. For this reason, the Stormwater Facilities Plan proposed in this report gives priority to construction of the larger basin-wide facilities

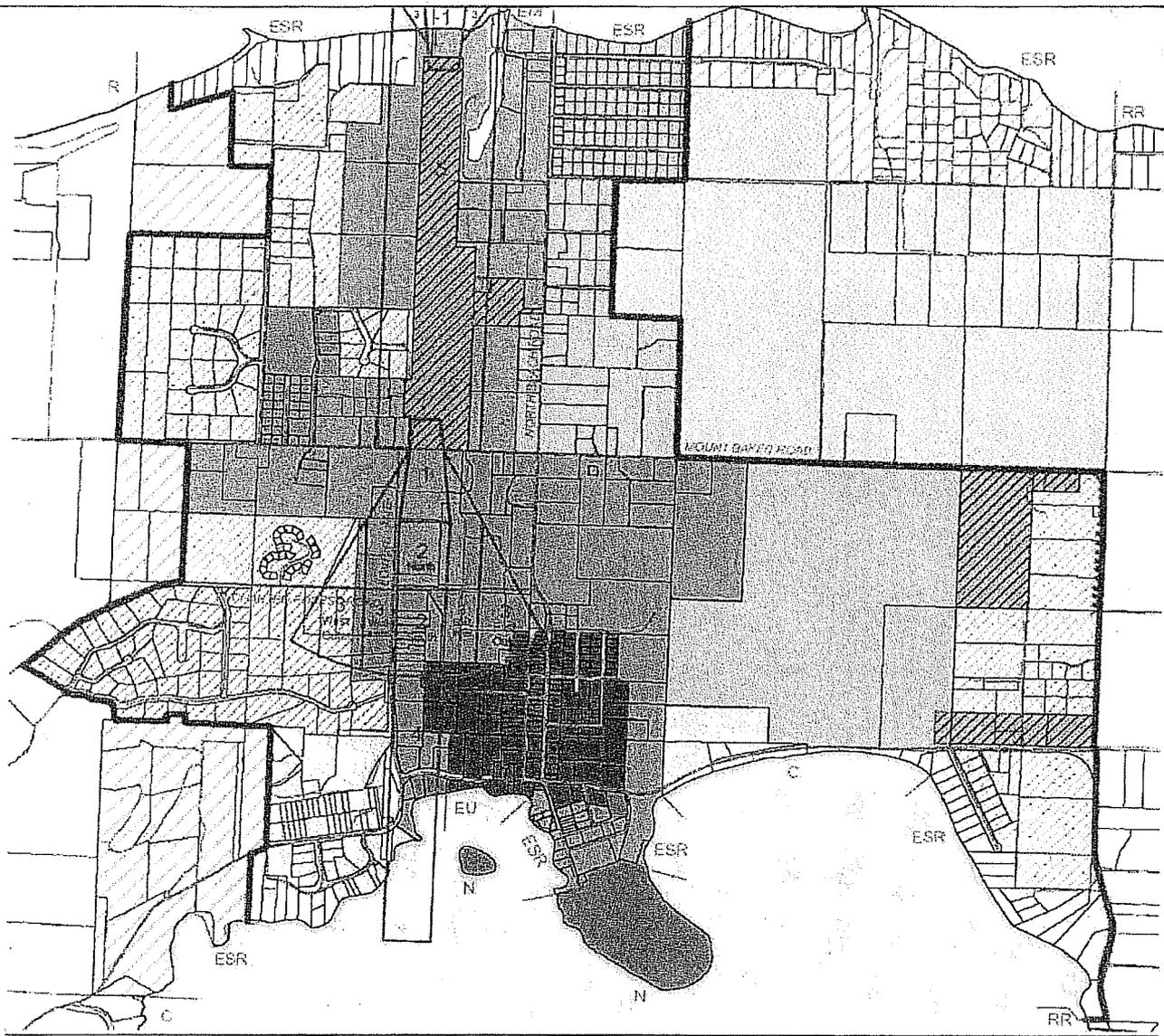


Figure 1. Land Use - Eastsound UGA

LEGEND

-  Urban Growth Area Boundary
-  Eastsound Residential 1/acre (max. 1 unit / acre)
-  Eastsound Residential 1/acre P*
-  Eastsound Residential 2/acre
-  Eastsound Residential 2/acre P*
-  Eastsound Residential 4/acre P*
-  Eastsound Residential 4-12/acre (min. 4 - max. 12 units / acre; see S/JCC 18.55.240)
-  Village Residential (min. 4 - max. 12 units / acre)
-  Village Commercial (min. 4 - max. 40 units / acre)
-  Marina (max. 8-8 units / acre)*
-  Service Park (residential use allowed only as accessory to commercial, institutional or industrial use)
-  Service and Light Industrial (residential use allowed only as accessory to commercial, institutional or industrial use)
-  Eastsound Airport District (no residential development is allowed)
-  Natural (max. 1 unit / parcel)
-  50-foot buffer area for properties adjoining Forest Resource land (see S/JCC 16.55.240 for conditions.)
- * In compliance with GMA requirements, site planning and reviews is required to ensure that the development will not preclude a density of at least 4 units per acre.
-  Eastsound Rural Residential (max. 1 unit / 5 acres)
-  Eastsound Rural (max. 1 unit / 5 acres)

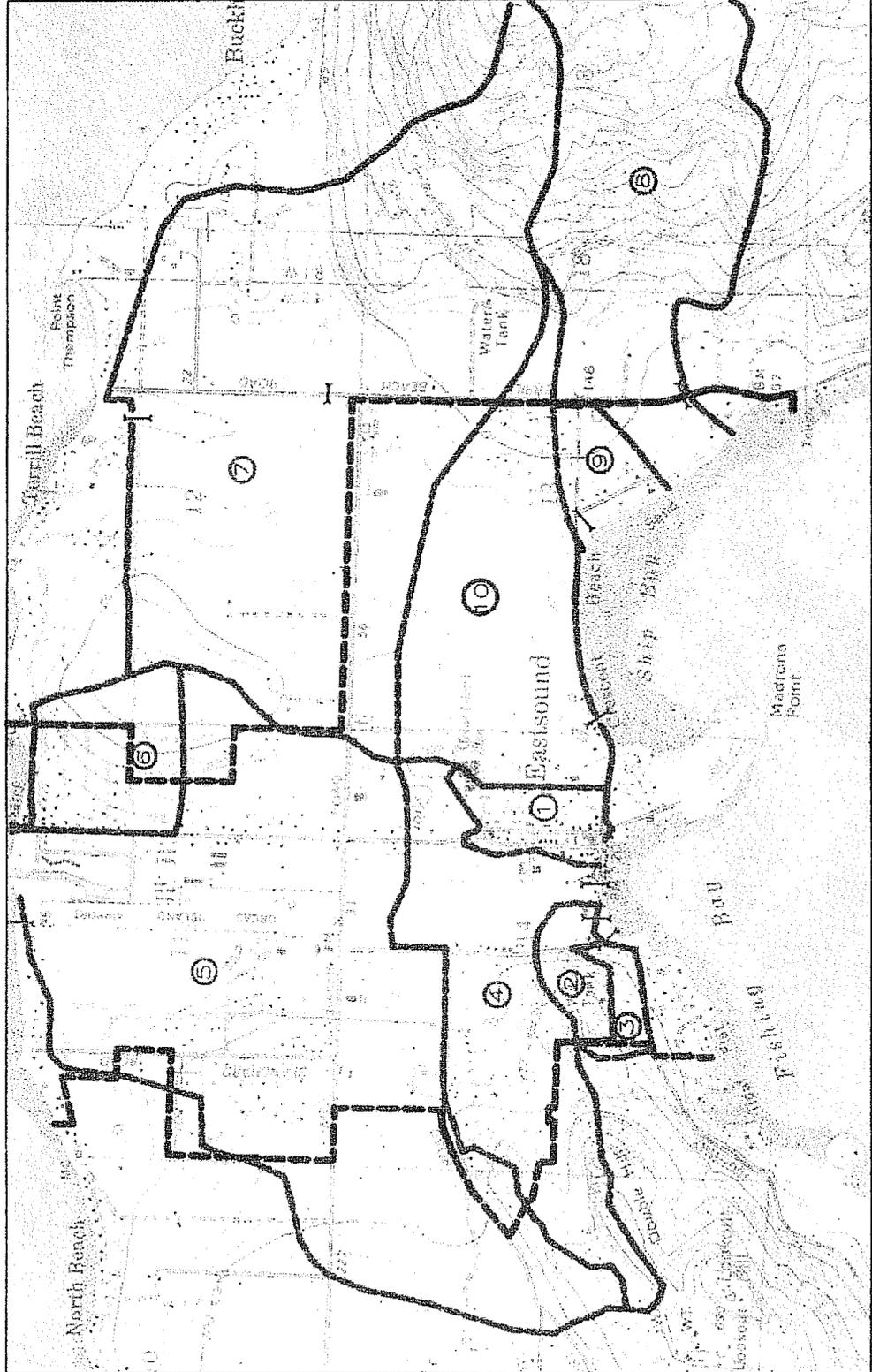


NOT TO SCALE



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LEGEND

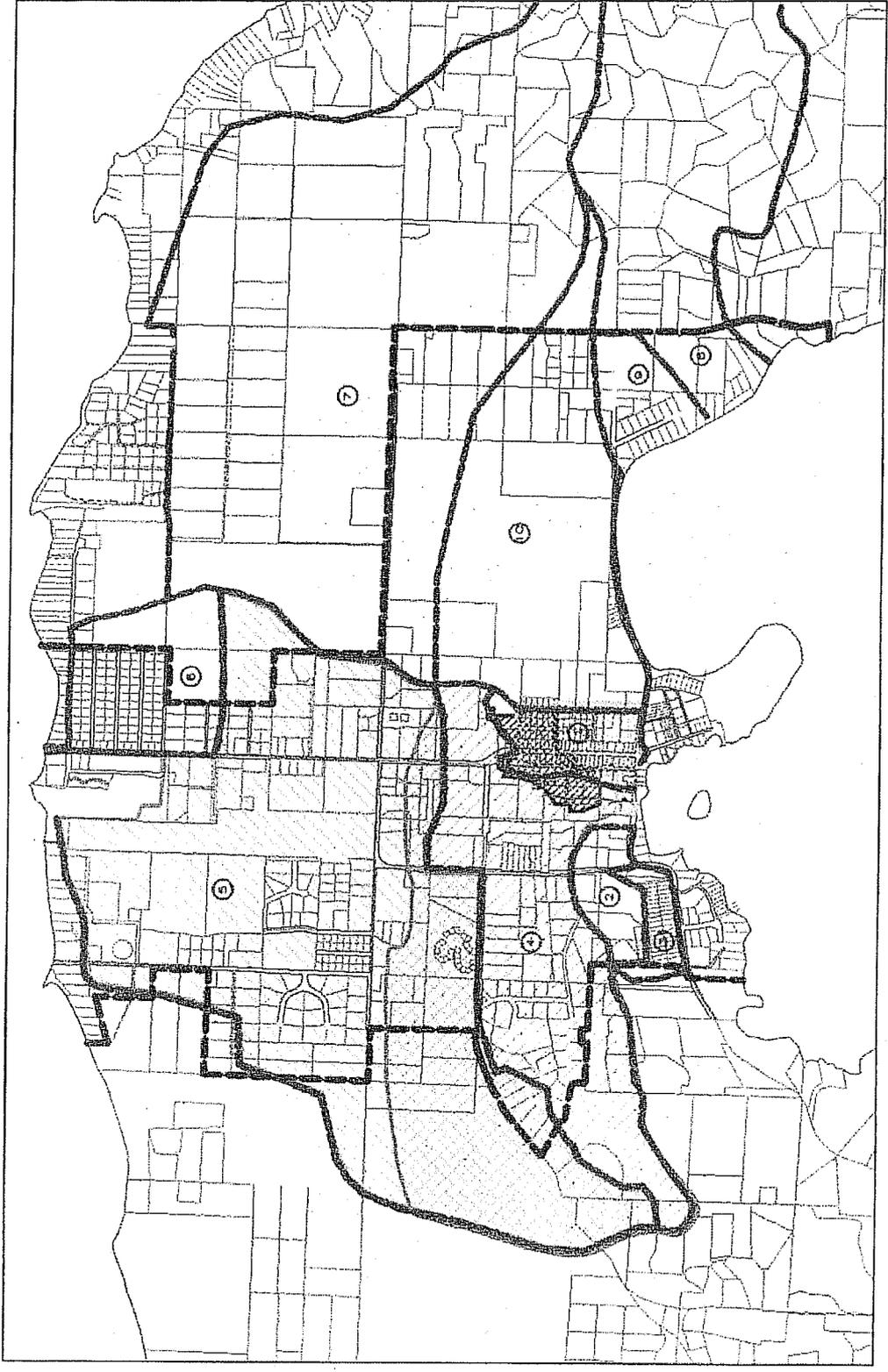
-  UGA BOUNDARY
-  DRAINAGE BASIN BOUNDARY
-  DRAINAGE BASIN NUMBER
-  PRINCIPAL BASIN OUTLET CULVERT LOCATION



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Figure 2
 EUGA Drainage Basins



LEGEND

-  UGA BOUNDARY
-  DRAINAGE BASIN BOUNDARY
-  DRAINAGE BASIN NUMBER
-  EASTSOUND STORMDRAIN DESIGN (STEVE BRAUN, 1983)
-  MOUNT PROPERTY STORMWATER CONTROL STUDY (HPE, 1999)
-  EASTSOUND SWALE WATERSHED EVALUATION (HPE, 1999)
-  AIRPORT DRAINAGE BASIN STUDY (HPE, 2003)

Figure 3
Previous Drainage Studies

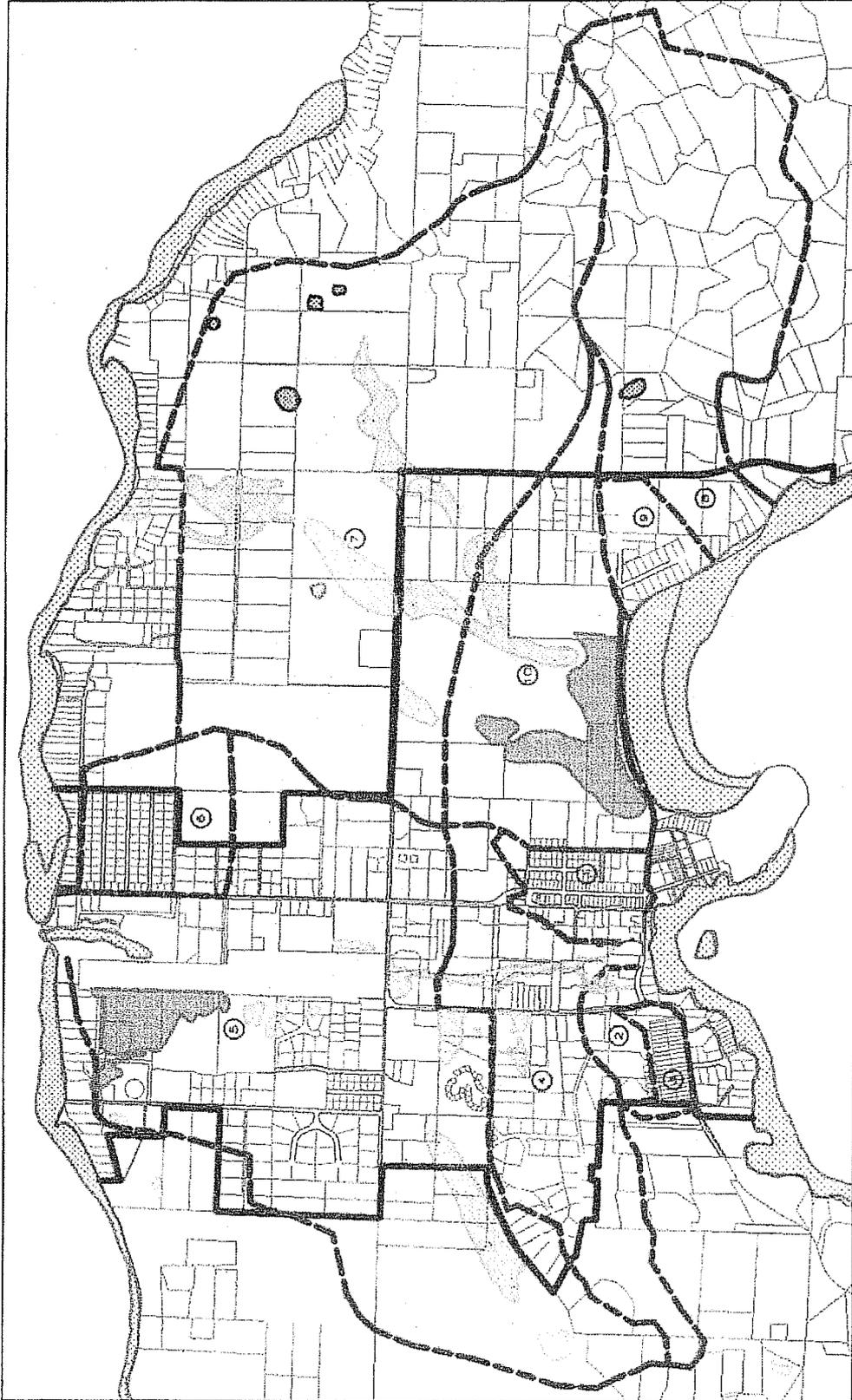


Figure 4
Wetlands Within the EUGA



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LEGEND

	UGA BOUNDARY		CLASS 1 WETLAND
	DRAINAGE BASIN BOUNDARY		CLASS 2 WETLAND
	DRAINAGE BASIN NUMBER		CLASS 3 WETLAND
			CLASS 4 WETLAND
			NEARSHORE
			UNKNOWN CLASS

* BASED ON COUNTY GIS RECORDS FOR "WETSHAPES"
 NOT DESIGNATED WETLANDS

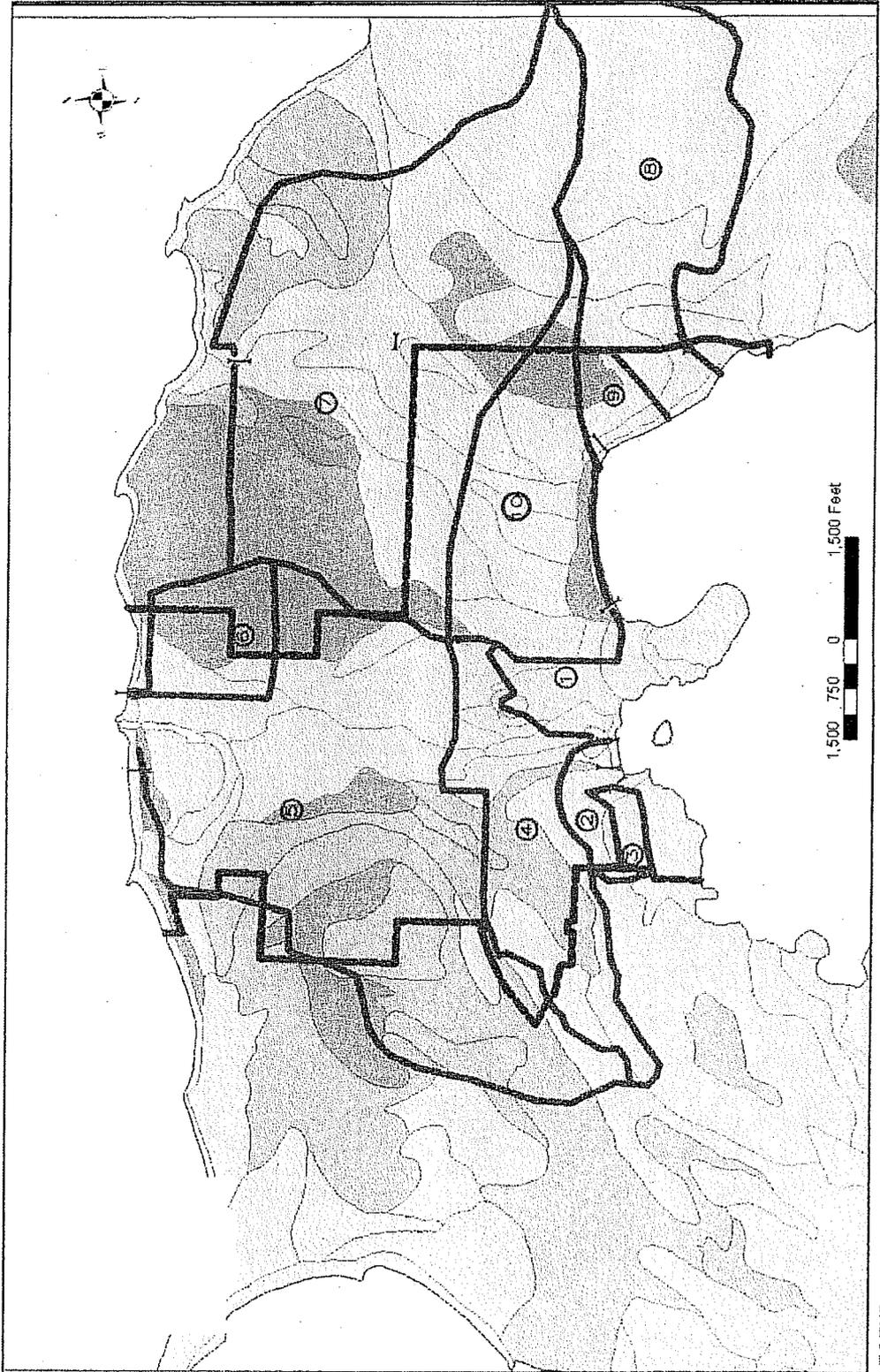


Figure 5
Soil Types (Hydro Groups)



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LEGEND		Legend	
	UCA BOUNDARY		HYDGRP A
	DRAINAGE BASIN BOUNDARY		HYDGRP C
	DRAINAGE BASIN NUMBER		HYDGRP D
	PRINCIPAL BASIN OUTLET CULVERT LOCATION		

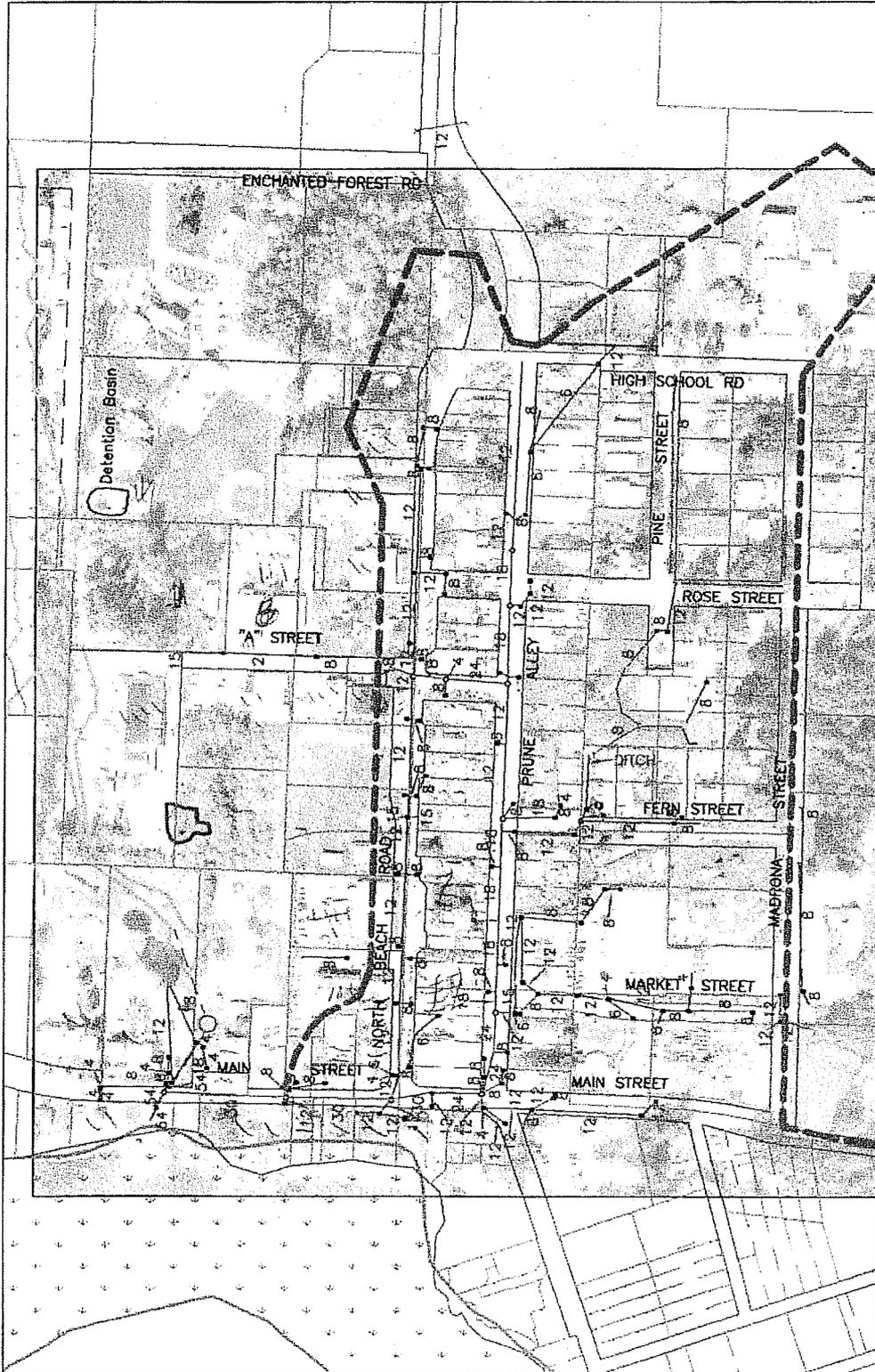


Figure 6
Basin 1
Existing Drainage System



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LEGEND	
18	CLASS 1 WETLAND
12	CLASS 2 WETLAND
8	CLASS 3 WETLAND
4	CLASS 4 WETLAND
0	NEARSHORE
—	UNKNOWN CLASS
—	STORM DRAIN PIPE AND SIZE
■	CATCH BASIN
○	MANHOLE
—	CULVERT LOCATION AND SIZE
—	DRAINAGE DITCH
—	DRAINAGE BASIN BOUNDARY

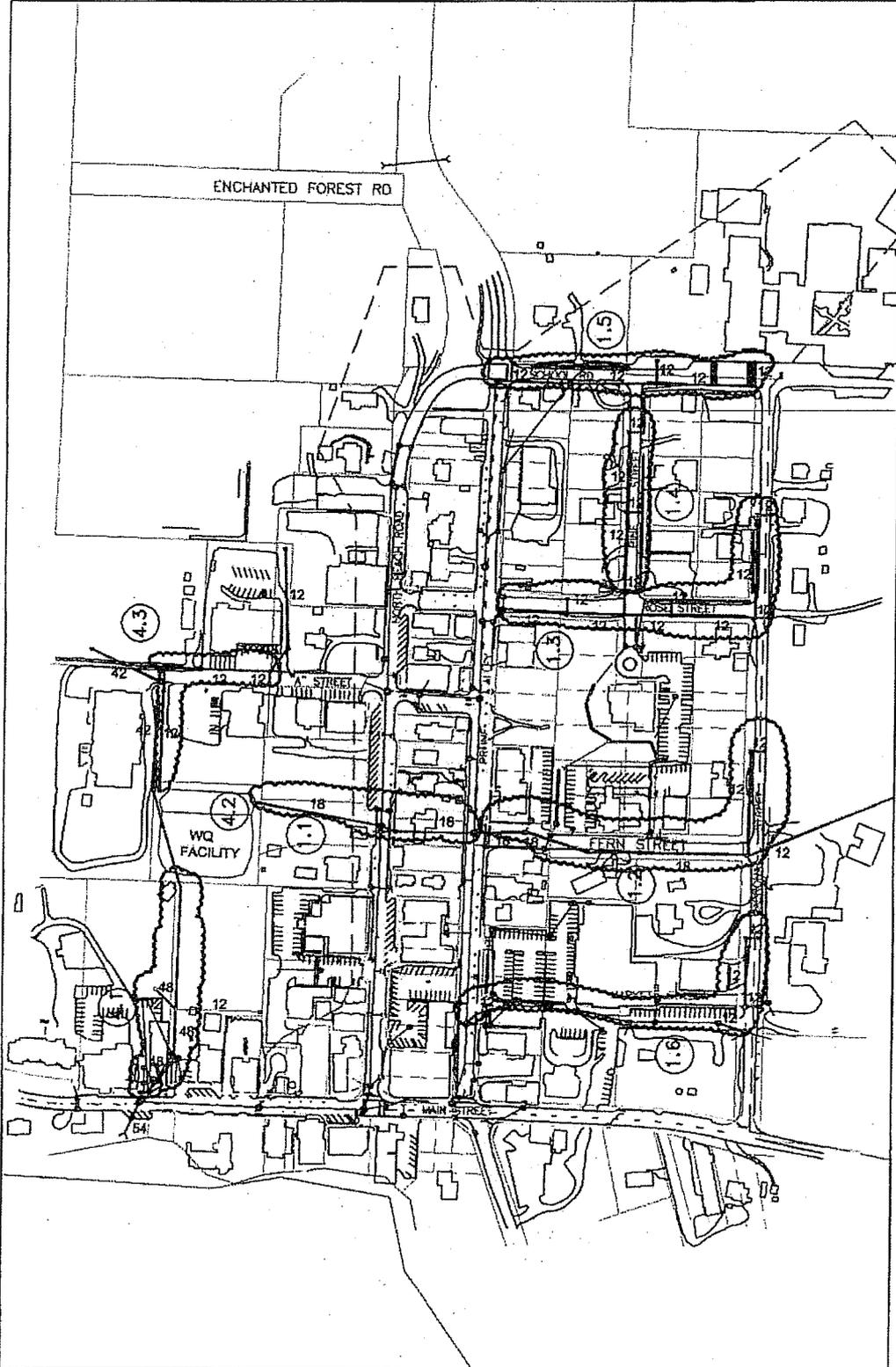


Figure 7
Basins 1 & 4
PROPOSED IMPROVEMENTS



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LEGEND

EXISTING STORM DRAIN	PROJECT NUMBER
CATCH BASIN	2.2
MANHOLE	
CULVERT LOCATION & SIZE	PROJECT LIMITS
DRAINAGE DITCH	12
DRAINAGE BASIN BOUNDARY	PROPOSED STORM DRAIN AND SIZE

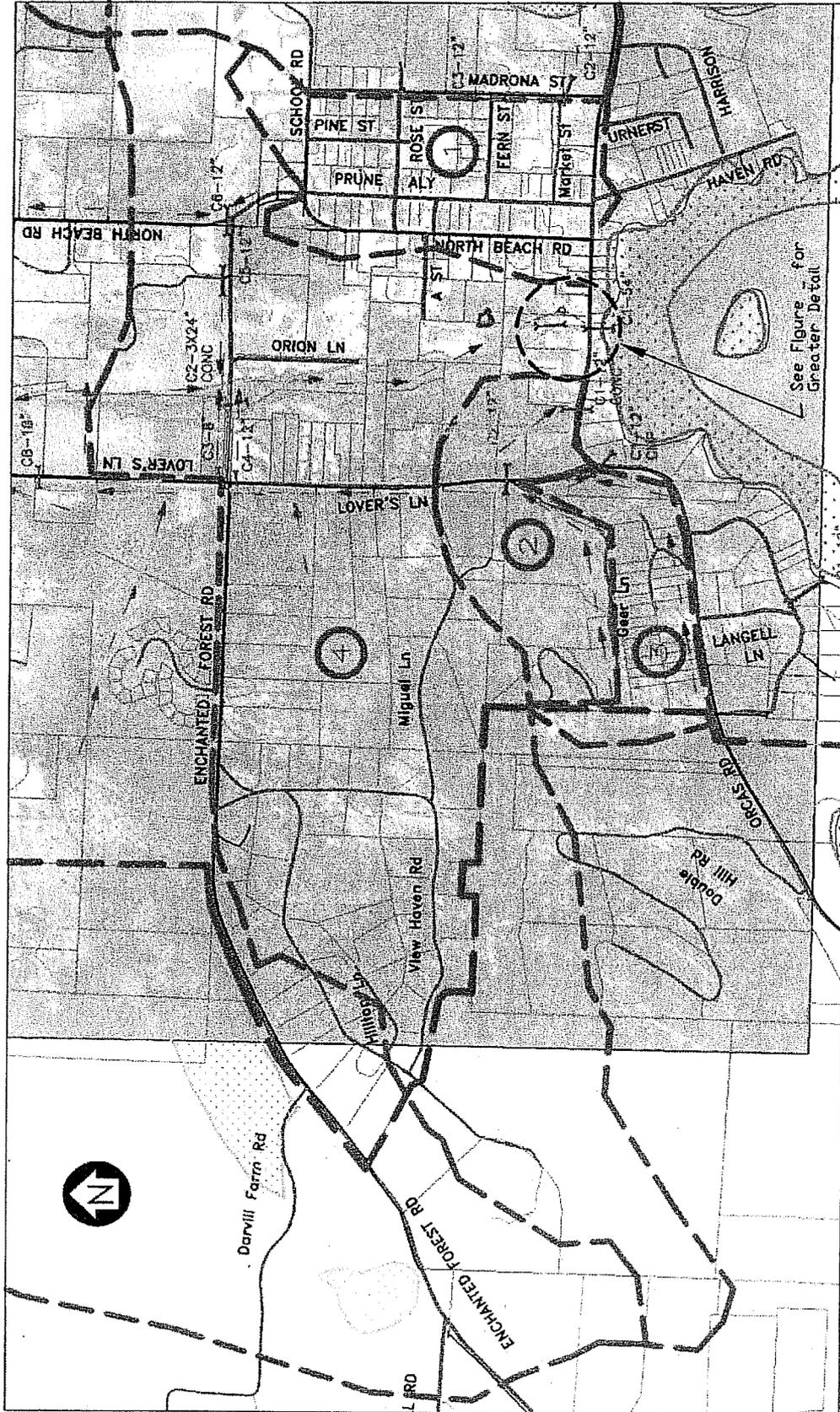


Figure 8
Basins 2, 3 & 4
Existing Drainage Systems



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LEGEND

	UGA BOUNDARY		CLASS 1 WETLAND
	UGA DRAINAGE BASIN BOUNDARY		CLASS 2 WETLAND
	CULVERT LOCATION, TYPE, AND SIZE (IF KNOWN)		CLASS 3 WETLAND
	DRAINAGE DITCH FLOW DIRECTION		CLASS 4 WETLAND
	DRAINAGE BASIN NUMBER		NEARSHORE
			UNKNOWN CLASS

See Figure for greater detail



LEGEND

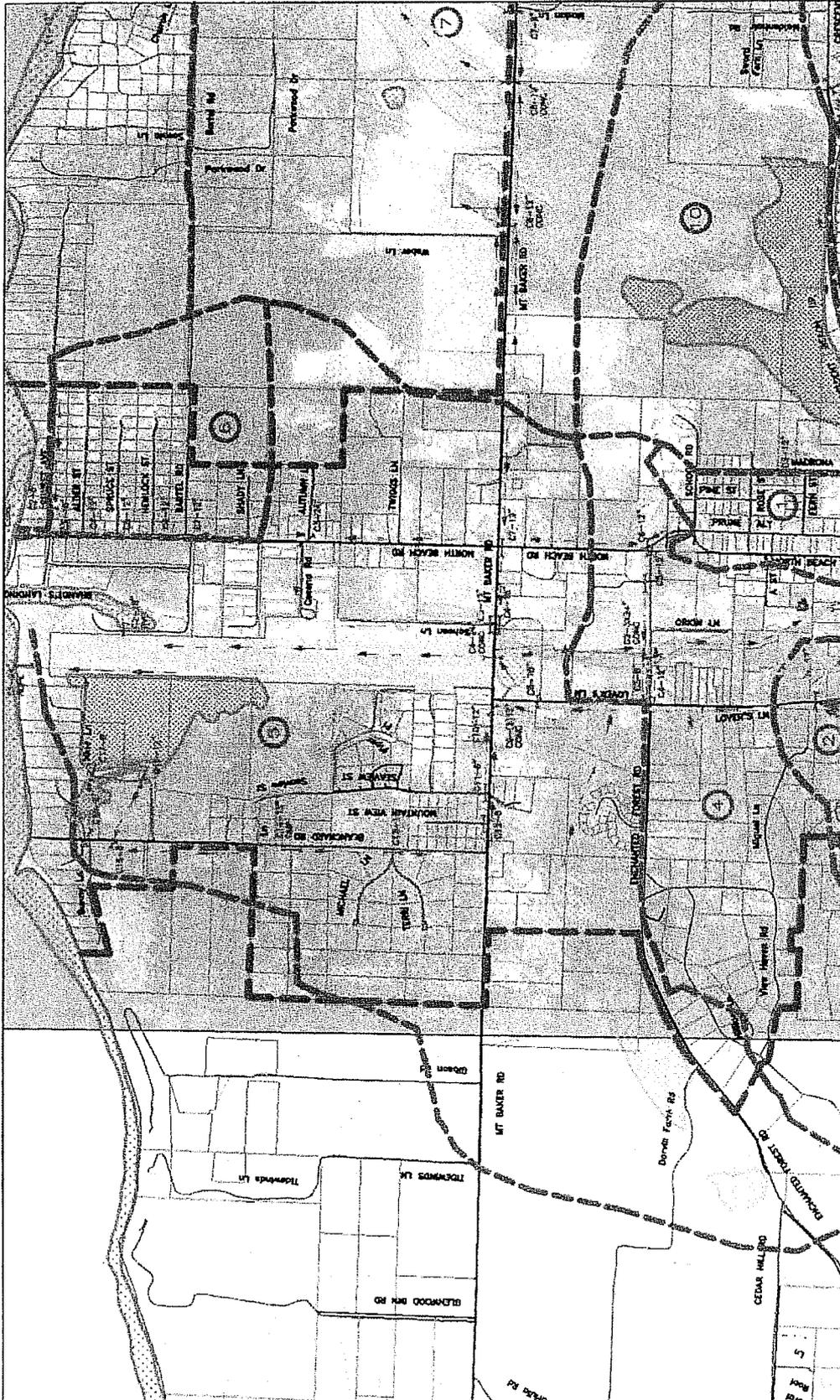
	EXISTING STORM DRAIN		PROJECT NUMBER
	CATCH BASIN		PROJECT LIMITS
	MANHOLE		PROPOSED STORM DRAIN AND SIZE
	CULVERT LOCATION & SIZE		
	DRAINAGE DITCH		
	DRAINAGE BASIN BOUNDARY		

	CLASS 1 WETLAND
	CLASS 2 WETLAND
	CLASS 3 WETLAND
	CLASS 4 WETLAND
	NEARSHORE
	UNKNOWN CLASS



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Figure 9
 Basin 2, 3 & 4
 PROPOSED IMPROVEMENTS



LEGEND

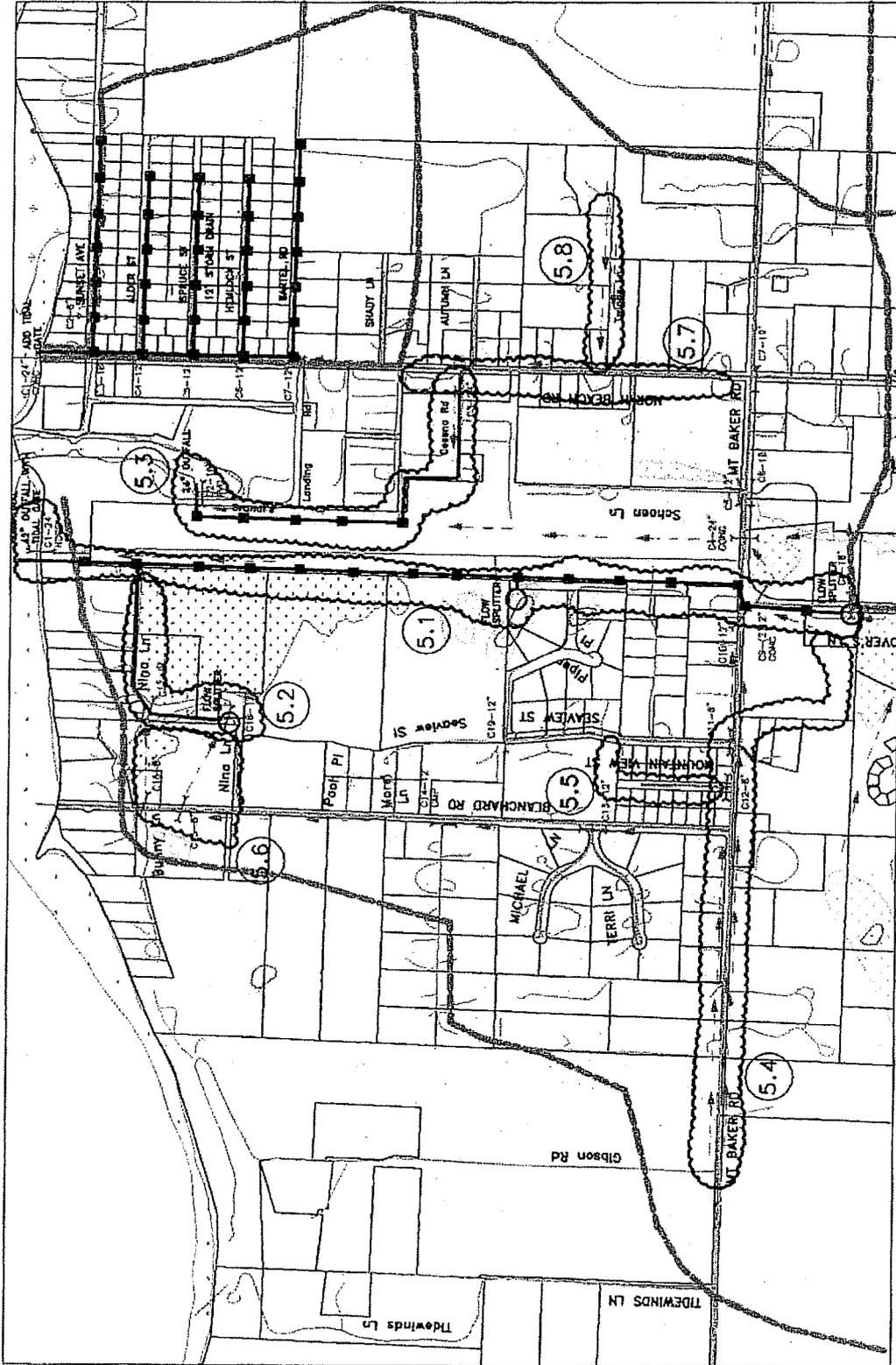
	UGA BOUNDARY		CLASS 1 WETLAND
	UGA DRAINAGE BASIN BOUNDARY		CLASS 2 WETLAND
	CULVERT LOCATION, TYPE, AND SIZE (IF KNOWN)		CLASS 3 WETLAND
	DRAINAGE DITCH FLOW DIRECTION		CLASS 4 WETLAND
	DRAINAGE BASIN NUMBER		NEARSHORE
			UNKNOWN CLASS



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Figure 10
Basins 5 & 6
Existing Drainage Systems



LEGEND

	EXISTING STORM DRAIN		PROJECT NUMBER
	CATCH BASIN		PROJECT LIMITS
	MANHOLE		PROPOSED STORM DRAIN AND SIZE
	CULVERT LOCATION & SIZE		DRAINAGE DITCH
	DRAINAGE BASIN BOUNDARY		



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Figure 12
 Basin 5
 PROPOSED IMPROVEMENTS

- CLASS 1 WETLAND
- CLASS 2 WETLAND
- CLASS 3 WETLAND
- CLASS 4 WETLAND
- NEARSHORE
- UNKNOWN CLASS

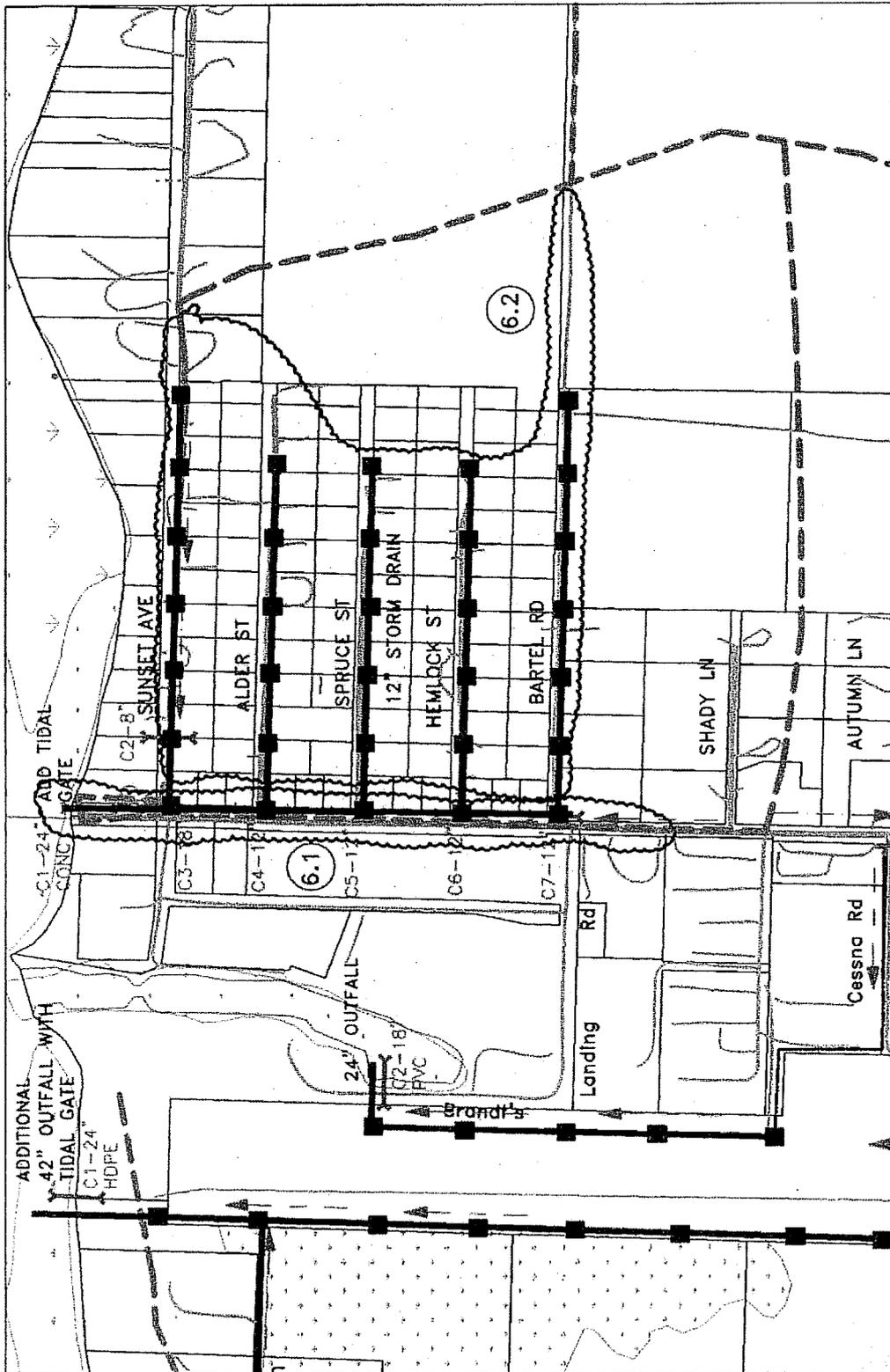


Figure 13
Basin 6
PROPOSED IMPROVEMENTS



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LEGEND	
	EXISTING STORM DRAIN
	CATCH BASIN
	MANHOLE
	CULVERT LOCATION & SIZE
	DRAINAGE DITCH
	DRAINAGE BASIN BOUNDARY
	PROJECT NUMBER
	PROJECT LIMITS
	PROPOSED STORM DRAIN AND SIZE
	CLASS 1 WETLAND
	CLASS 2 WETLAND
	CLASS 3 WETLAND
	CLASS 4 WETLAND
	NEARSHORE
	UNKNOWN CLASS

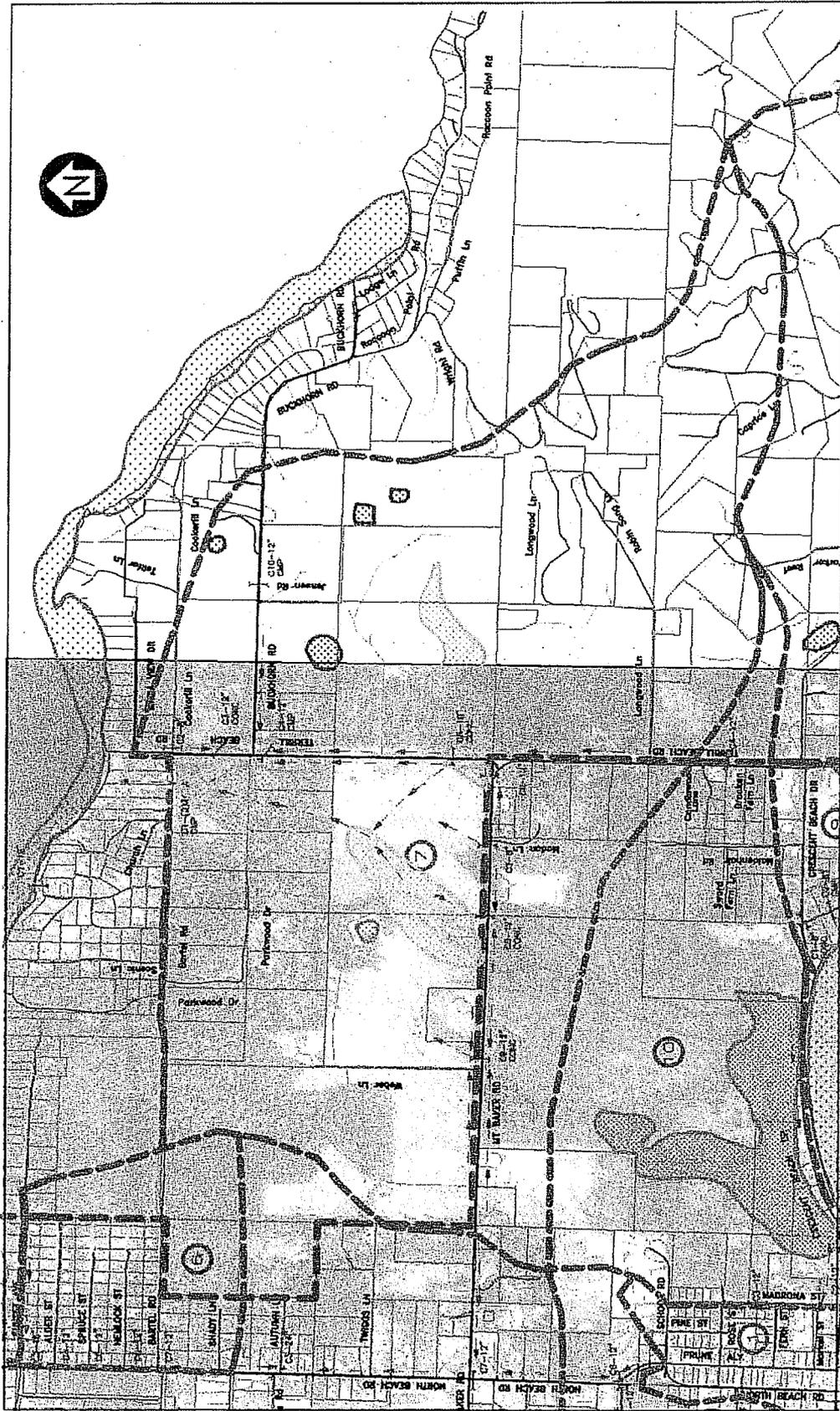


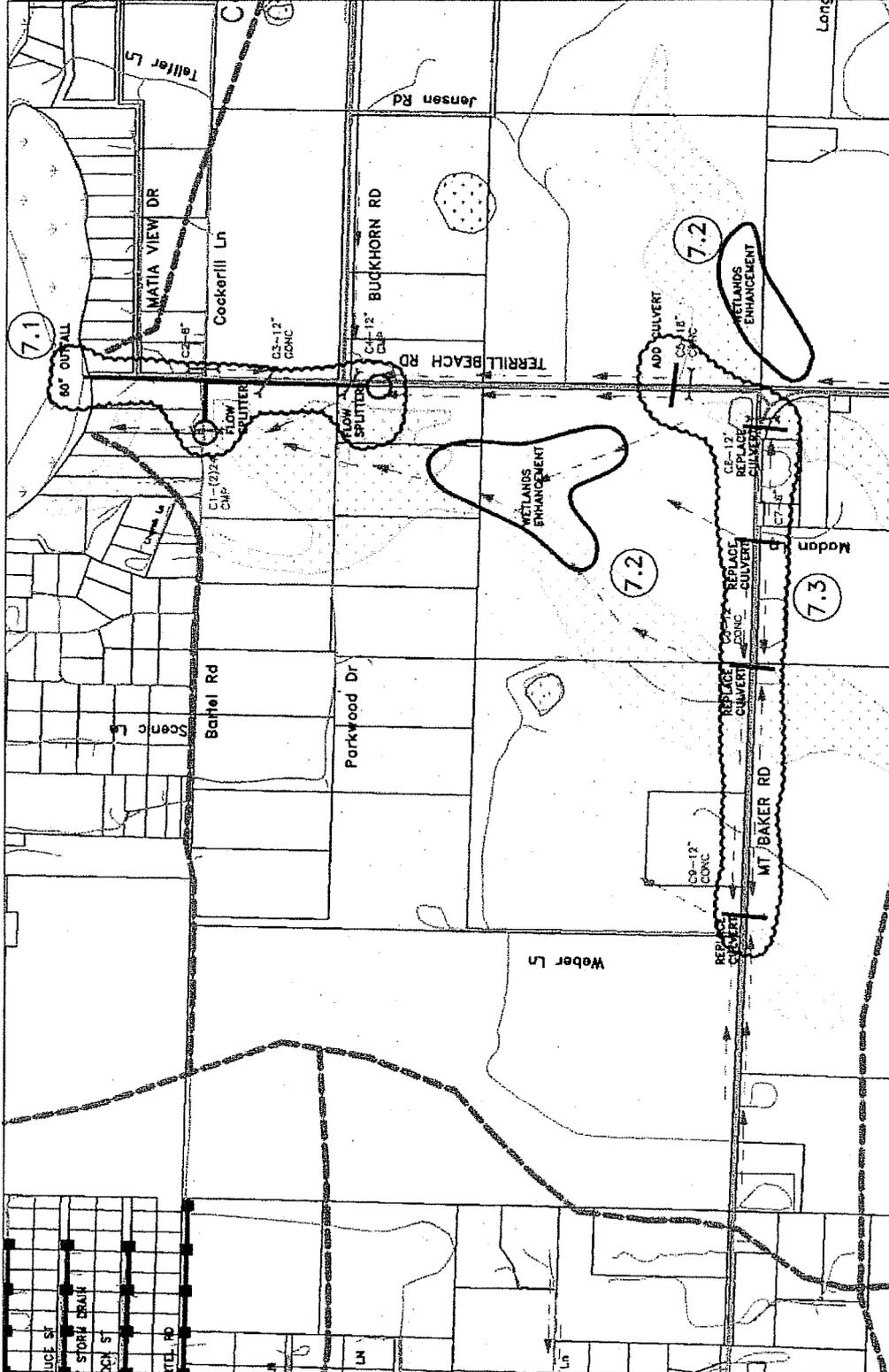
Figure 14
Basin 7
Existing Drainage System



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LEGEND

	UGA BOUNDARY		CLASS 1 WETLAND
	UGA DRAINAGE BASIN BOUNDARY		CLASS 2 WETLAND
	CULVERT LOCATION, TYPE, AND SIZE (IF KNOWN)		CLASS 3 WETLAND
	DRAINAGE DITCH FLOW DIRECTION		CLASS 4 WETLAND
	DRAINAGE BASIN NUMBER		NEARSHORE
			UNKNOWN CLASS



LEGEND

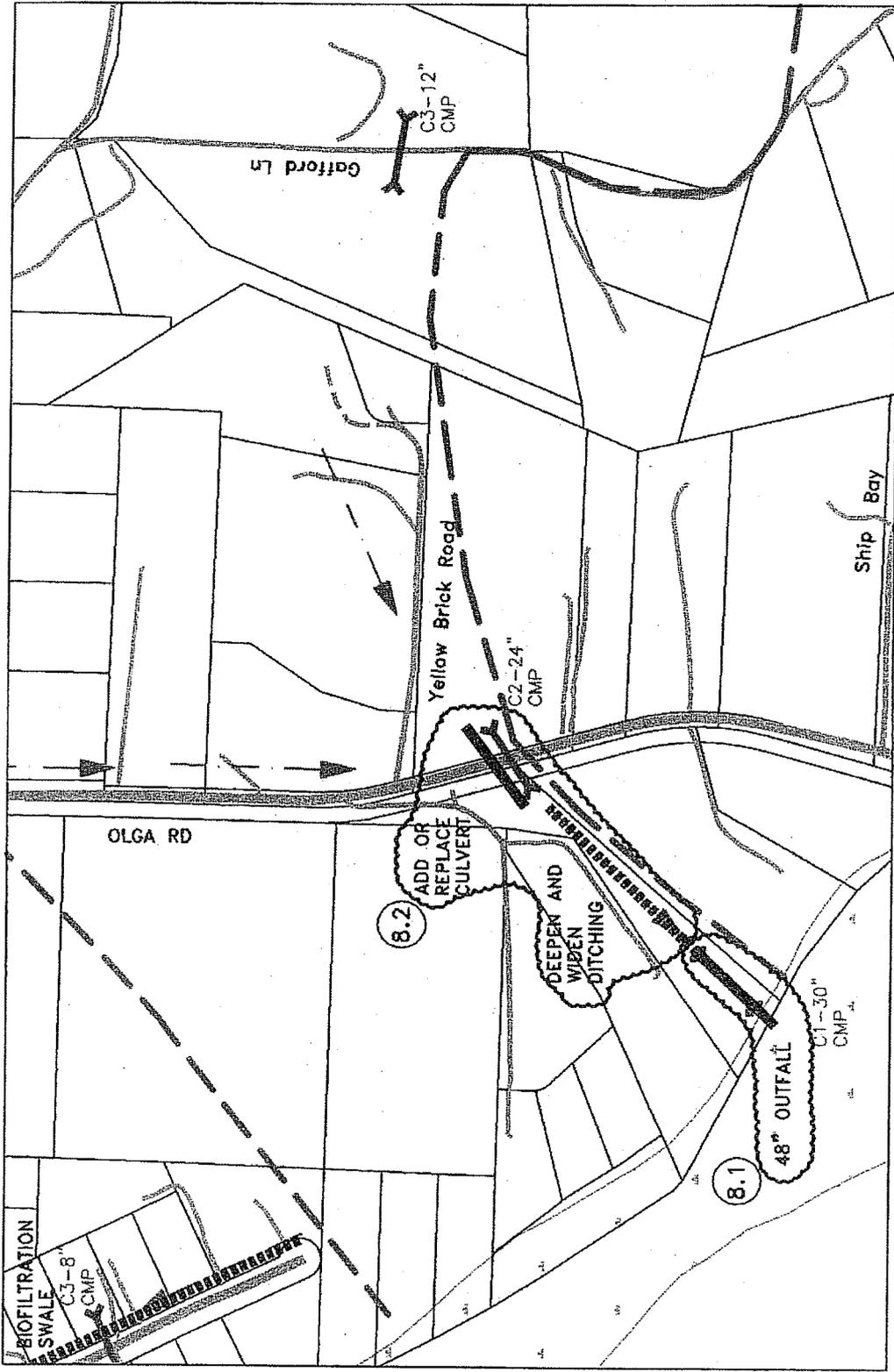
	EXISTING STORM DRAIN		PROJECT NUMBER
	CATCH BASIN		PROJECT LIMITS
	MANHOLE		CULVERT LOCATION & SIZE
	DRAINAGE DITCH		DRAINAGE BASIN BOUNDARY
	CLASS 1 WETLAND		CLASS 2 WETLAND
	CLASS 3 WETLAND		CLASS 4 WETLAND
	NEARSHORE		UNKNOWN CLASS

Figure 15
Basin 7
PROPOSED IMPROVEMENTS



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LEGEND

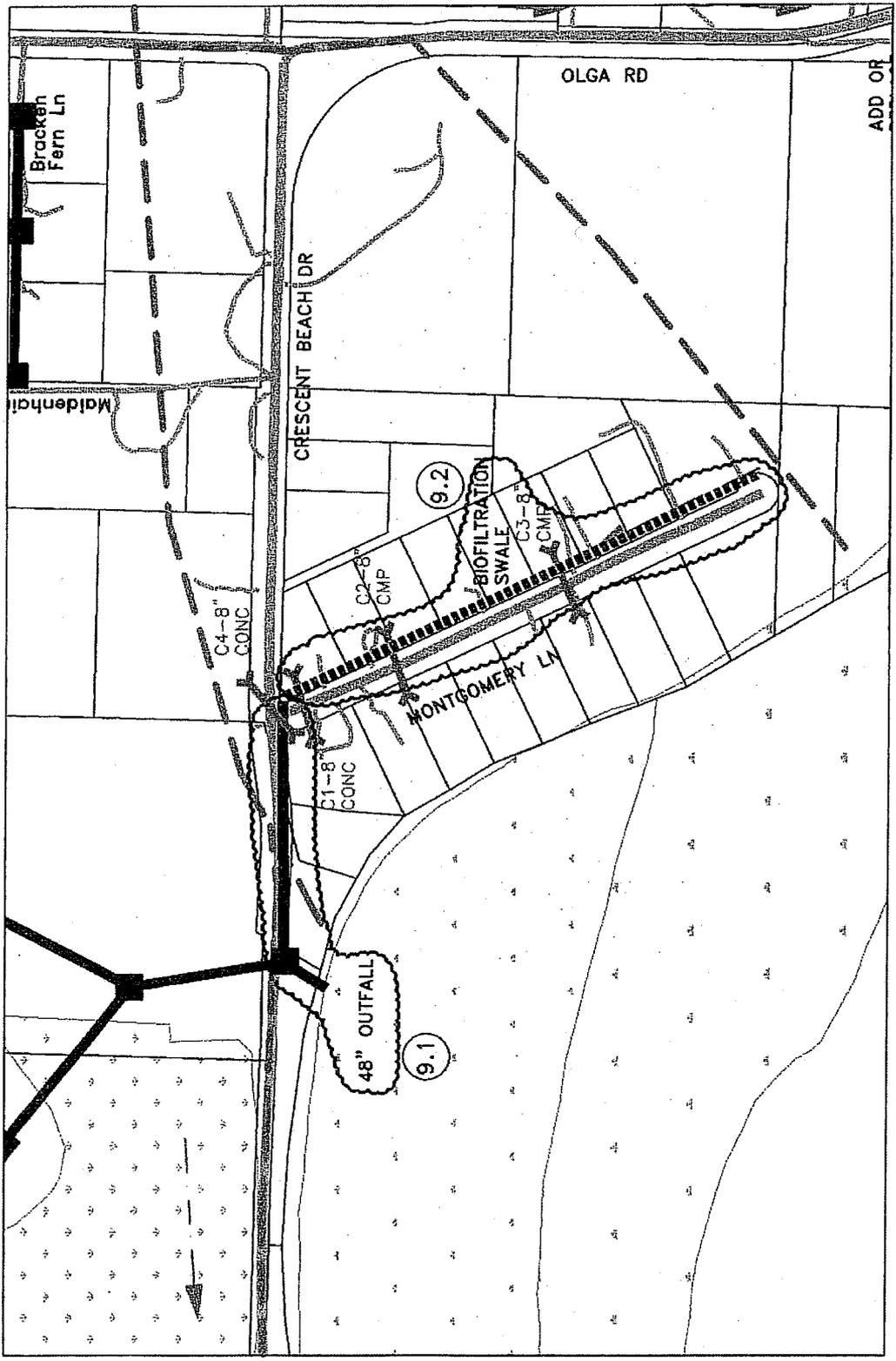
	EXISTING STORM DRAIN		CLASS 1 WETLAND
	CATCH BASIN		CLASS 2 WETLAND
	MANHOLE		CLASS 3 WETLAND
	CULVERT LOCATION & SIZE		CLASS 4 WETLAND
	DRAINAGE DITCH		NEARSHORE
	DRAINAGE BASIN BOUNDARY		UNKNOWN CLASS
	PROJECT NUMBER		PROJECT LIMITS
	48" OUTFALL		PROPOSED STORM DRAIN AND SIZE
	12" OUTFALL		



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Figure 17
 Basin 8
 PROPOSED IMPROVEMENTS



LEGEND

	EXISTING STORM DRAIN		PROJECT NUMBER		CLASS 1 WETLAND
	CATCH BASIN		PROJECT LIMITS		CLASS 2 WETLAND
	MANHOLE		PROPOSED STORM DRAIN AND SIZE		CLASS 3 WETLAND
	CULVERT LOCATION & SIZE				CLASS 4 WETLAND
	DRAINAGE DITCH				NEARSHORE
	DRAINAGE BASIN BOUNDARY				UNKNOWN CLASS



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Figure 18
 Basin 9
 PROPOSED IMPROVEMENTS

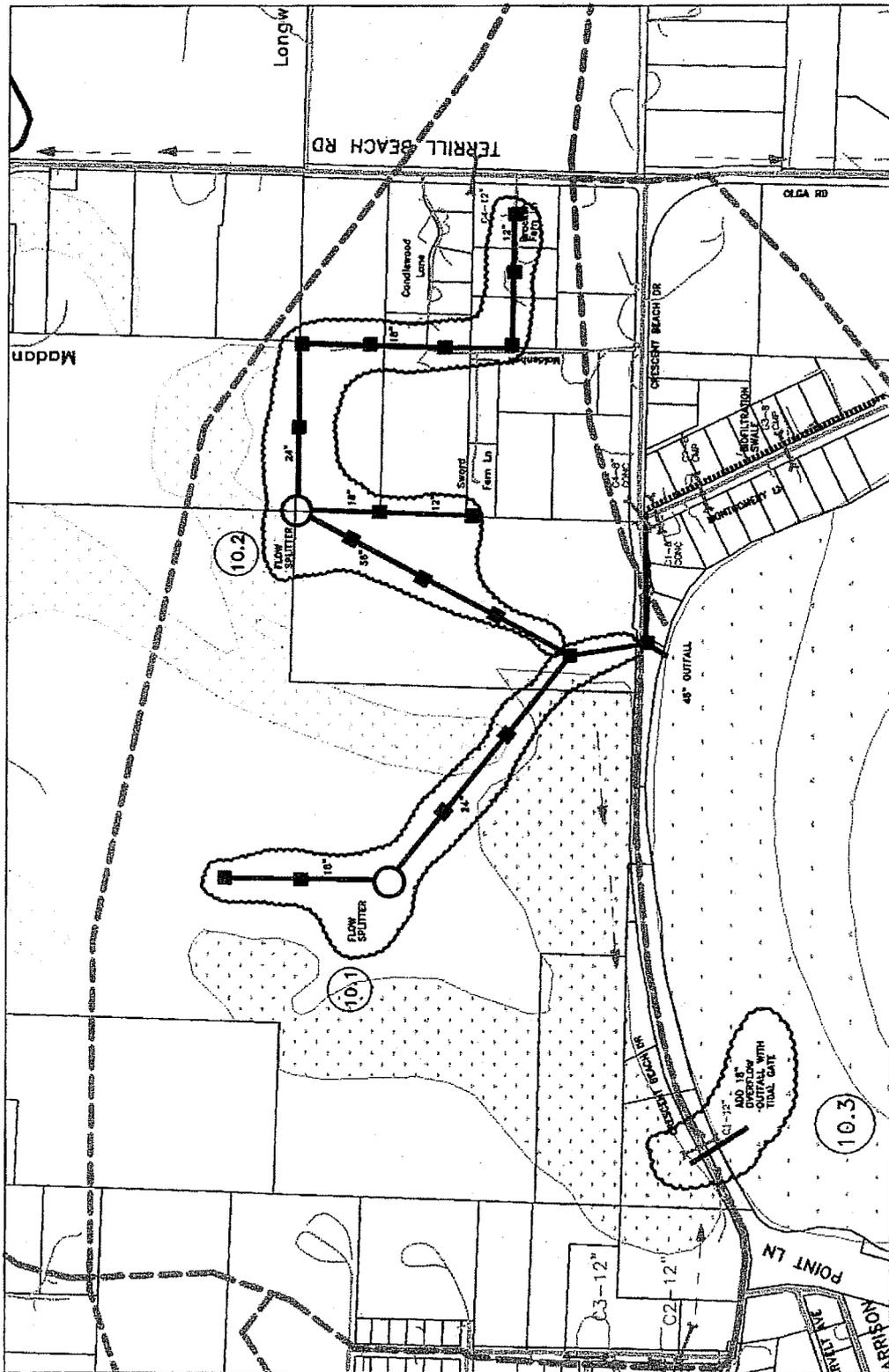


Figure 19
Basin 10
PROPOSED IMPROVEMENTS



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LEGEND	
	EXISTING STORM DRAIN
	CATCH BASIN
	MANHOLE
	CULVERT LOCATION & SIZE
	DRAINAGE DITCH
	DRAINAGE BASIN BOUNDARY
	PROJECT NUMBER
	PROJECT LIMITS
	PROPOSED STORM DRAIN AND SIZE
	CLASS 1 WETLAND
	CLASS 2 WETLAND
	CLASS 3 WETLAND
	CLASS 4 WETLAND
	NEARSHORE
	UNKNOWN CLASS

APPENDIX

Project Cost Estimating Detail

PRELIMINARY PROJECT COST ESTIMATES

Cost Estimating Assumptions

This outline of project costs is based on culvert and inlet sizes provided by others and is based on the following assumptions:

1. Project costs include design, permitting, bidding, construction and construction management costs. Construction costs include mobilization/demobilization, overhead and profit, taxes, and a contingency of 20%.
2. Estimates assume that storm drainage improvements will be completed by contractors, one project at a time, through an open bidding process. Mobilization, construction overhead and planning costs would be less if these small projects were combined. A 10% to 15% project savings was assumed for combining projects valued at \$250,000 or more.
3. Costs are based on selected historical storm drainage construction costs inflated 3% per annum and adjusted to current (2005) dollars. The 3% per annum rate matches the Engineering News Record Infrastructure cost tracking data for the past 10 years.
4. Easement requirements were estimated by the County Engineer. A 20-foot wide easement was assumed necessary for all conveyance routes across private property. Drainage easements were assumed to cost \$4/SF (\$80.00/LF). Most projects that require easements were assumed to be granted to the County by private owners in exchange for future maintenance and other considerations.
5. Ditches with grades greater than 5% were assumed to be rock-lined and have rock check dams every 100 feet. Ditches with grades greater than 8% were assumed to be rock-lined and have check dams every 50 feet.
6. Ditch improvements are assumed to create a ditch 2-ft. deep with 2.5:1 side slopes. The existing ditch section was assumed to be 6-inches deep with 1.5:1 side slopes. It was assumed that right-of-way and utility clearances are adequate for this strategy in identified areas. Proposed ditch improvement locations were not checked for compatibility with existing easements and utility constraints.

7. The following projects were assumed to require shoreline permits:

- Project 2.1 – Lover's Lane Stormdrain: Geer Lane to Waterfront Park
- Project 3.1 – Orcas Road Stormdrain and Outfall
- Project 4.1 – Mount Property to Main Street Stormdrain
- Project 4.6 – Fishing Bay Outfall Erosion Protection
- Project 5.1 – West Airport Stormdrain: Lover's Lane to North Shore
- Project 5.2 – Nina Lane Stormdrain
- Project 5.3 – East Airport Stormdrain: North Beach Road to Brandt's Landing Marina
- Project 6.1 – North Beach Road Stormdrain: Shady Lane to Basin Outfall
- Project 6.2 – Sunset Avenue, Alder Street, Spruce Street, Hemlock Street Stormdrain
- Project 7.1 – Terrill Beach Road Stormdrain and Outfall
- Project 8.1 – Ship Bay Outfall Improvement
- Project 10.1 – Buck Property Stormdrain, with Flow Splitter
- Project 10.3 – Crescent Beach Wetland Overflow Outfall

The following projects were assumed to require archaeology permits:

- Project 4.1 – Mount Property to Main Street Stormdrain
- Project 4.6 – Fishing Bay Outfall Erosion Protection
- Project 9.1 – Montgomery Lane to Crescent Beach Stormdrain and Outfall
- Project 10.3 – Crescent Beach Wetland Overflow Outfall

8. The following projects were assumed to require wetland studies:

- Project 4.1 – Mount Property to Main Street Stormdrain
- Project 4.7 – Eastsound Swale Enhancement
- Project 5.1 – West Airport Stormdrain: Lover's Lane to North Shore
- Project 5.2 – Nina Lane Stormdrain
- Project 7.1 – Terrill Beach Road Stormdrain and Outfall
- Project 7.2 – Terrill Beach Wetlands Enhancement
- Project 10.1 – Buck Property Stormdrain, with Flow Splitter
- Project 10.2 – Bracken Fern Lane Stormdrain, with Flow Splitter
- Project 10.3 – Crescent Beach Wetland Overflow Outfall

9. Average culvert cover is 2' unless otherwise noted. All culverts were assumed to be N-12 double-walled Polyethylene pipe (Advanced Drainage Systems or equal). Manholes are assumed to be 8 feet deep, unless otherwise noted.

8. Trenching costs were increased by \$3.50 per lineal foot on the following listed projects to cover utility conflicts.

- Project 1.1 – Prune Alley to Water Quality Facility Stormdrain
- Project 1.2 – Fern Street Stormdrain: Madrona Street to Prune Alley
- Project 1.3 – Rose Street Stormdrain: Madrona Street to Prune Alley
- Project 1.4 – Pine Street Stormdrain
- Project 1.5 – School Road Stormdrain: Madrona Street to Prune Alley
- Project 1.6 – Market Street Stormdrain Improvements
- Project 4.1 – Mount Property to Main Street Stormdrain
- Project 4.3 – "A" Street Stormdrain to "Mount Property" Stormdrain with Flow Splitter
- Project 4.4 – Eastsound Swale Bypass Stormdrain: Enchanted Forest Road to Main Street with Flow Splitter Manhole
- Project 6.1 – North Beach Road Stormdrain: Shady Lane to Basin Outfall
- Project 6.2 – Sunset Avenue, Alder Street, Spruce Street, Hemlock Street Stormdrain

These assumptions may be changed in the future as the basin areas develop. However, they provide a rational basis for planning in the Eastsound UGA.

Preliminary Project Cost Estimates
 Projects Basin 1
 Eastsound UGA Drainage Proposal
 SJCPCW



Cost Basis: June-05
 Prepared: 22-Dec-04
 Estimated: DSD
 Checked: TEM
 Project 1.1 Prune Alley

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 18" N-12	400	LF	\$ 55.77	\$ 22,307	
2	CB 48" Type 2	2	EA	\$ 2,602.47	\$ 5,205	
3	CB Type 1	1	EA	\$ 1,239.27	\$ 1,239	
4	Ex. Utility Conflict resolution	400	LF	\$ 3.50	\$ 1,400	
5	Trench in road, select b/f, repair, traffic	180	LF	\$ 22.00	\$ 3,960	
6	Mobilization and Misc.	1	LS	\$ 5,200.00	\$ 5,200	1
Subtotal					\$ 38,311	
Contingency				20%	\$ 7,662	
Sales Tax				7.7%	\$ 3,632	
Estimated Construction Cost					\$ 50,806	
Engineering and Construction Inspection				15%	\$ 7,621	
Estimated Project Cost					\$ 58,427	

- Notes:
- Highlighted unit costs are assumed.
 - Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
 - Easements required, assumed donated by owner for maintenance and other considerations.

Project 1.2 Fern Street

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 18" N-12	480	LF	\$ 55.77	\$ 26,788	
2	Storm Pipe 12" N-12	200	LF	\$ 49.57	\$ 9,914	
3	Trench Safety > 4' depth, < 8'	200	LF	\$ 1.24	\$ 248	
4	Trench Safety > 8' depth, < 12'	200	LF	\$ 7.00	\$ 1,400	2
5	Trench Safety > 12' depth, < 20'	300	LF	\$ 19.00	\$ 5,700	2
6	CB 48" Type 2	3	EA	\$ 2,602.47	\$ 7,807	2
7	CB Type 1	2	LS	\$ 1,239.27	\$ 2,479	
8	Trench in road, select b/f, repair, traffic	680	LF	\$ 22.00	\$ 14,960	
9	Ex. Utility Conflict resolution	680	LF	\$ 3.50	\$ 2,380	
10	Mobilization and Misc.	1	LS	\$ 10,500.00	\$ 10,500	1
Subtotal					\$ 82,166	
Contingency				20%	\$ 16,431	
Sales Tax				7.7%	\$ 7,591	
Estimated Construction Cost					\$ 106,178	
Engineering And Construction Inspection				20%	\$ 21,236	3
Estimated Project Cost					\$ 127,414	

- Notes:
- Highlighted unit costs are assumed.
 - Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
 - Assumed costs of increased trench depth to 20' max.
 - Special requirements, deep trench/ boring, directional drilling

1.3 Rose Street Storm Drain: Madrona Street to Prune Alley

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
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1	Storm Pipe 12" N-12	560 LF	\$ 49.57	\$	27,760	
2	Storm Pipe 12" N-12	250 LF	\$ 49.57	\$	12,393	
3	CB Type 1	9 EA	\$ 1,239.27	\$	11,153	
4	Trench in road, select b/f, repair, traffic	810 LF	\$ 22.00	\$	17,820	
5	Ex. Utility Conflict resolution	810 LF	\$ 3.50	\$	2,835	
6	Mobilization and Misc.	1 LS	\$ 10,700.00	\$	10,700	1
Subtotal					\$	82,681
Contingency					20%	\$ 16,532
Sales Tax					7.7%	\$ 7,638
Estimated Construction Cost					\$	106,831
Engineering and Construction Inspection					15%	\$ 16,025
Estimated Project Cost					\$	122,856

Notes:

- 1 Highlighted unit costs are assumed.
- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.

1.4 **Pine Street Storm Drain**

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 12" N-12	425 LF		\$ 49.57	\$ 21,068	
2	CB Type 1	6 EA		\$ 1,239.27	\$ 7,436	
3	Trench in road, select b/f, repair, traffic	425 LF		\$ 22.00	\$ 9,350	
4	Ex. Utility Conflict resolution	425 LF		\$ 3.50	\$ 1,488	
5	Mobilization and Misc.	1 LS		\$ 5,800.00	\$ 5,800	1
Subtotal					\$	46,141
Contingency					20%	\$ 9,028
Sales Tax					7.7%	\$ 4,171
Estimated Construction Cost					\$	58,340
Engineering and Construction Inspection					15%	\$ 8,751
Estimated Project Cost					\$	67,091

Notes:

- 1 Highlighted unit costs are assumed.
- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.

1.5 **School Road Storm Drain: Madrona Street to Prune Alley**

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 12" N-12	550 LF		\$ 49.57	\$ 27,264	
2	CB Type 1	6 EA		\$ 1,239.27	\$ 7,436	
3	Trench in road, select b/f, repair, traffic	550 LF		\$ 22.00	\$ 12,100	
4	Ex. Utility Conflict resolution	550 LF		\$ 3.50	\$ 1,925	
5	Mobilization and Misc.	1 LS		\$ 7,200.00	\$ 7,200	1
Subtotal					\$	65,926
Contingency					20%	\$ 11,185
Sales Tax					7.7%	\$ 5,167
Estimated Construction Cost					\$	72,277
Engineering and Construction Inspection					15%	\$ 10,842
Estimated Project Cost					\$	83,119

Notes:

- 1 Highlighted unit costs are assumed.
- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.

1.6 **Market Street Storm Drain Improvements**

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
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1	Storm Pipe 12" N-12	330 LF	\$ 49.57	\$	16,358
2	CB 48" Type 2	1 EA	\$ 2,602.47	\$	2,602
3	CB Type 1	5 EA	\$ 1,239.27	\$	6,196
4	Trench in road, select b/f, repair, traffic	330 LF	\$ 22.00	\$	7,260
5	Ex. Utility Conflict resolution	330 LF	\$ 3.50	\$	1,155
6	Flow Splitter Insert in Type 2 CB	1 LS	\$ 1,000.00	\$	1,000
7	Mobilization and Misc.	1 LS	\$ 5,100.00	\$	5,100
	Subtotal			\$	38,672
	Contingency	20%		\$	7,934
	Sales Tax	7.7%		\$	3,686
	Estimated Construction Cost			\$	51,272
	Engineering and Construction Inspection	15%		\$	7,691
	Estimated Project Cost			\$	58,963

Notes:

- Highlighted unit costs are assumed.
- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 2 Easements required, assumed donated by owner for maintenance and other considerations.

All

Basin 1 \$ 517,868

Preliminary Project Cost Estimates
 Projects Basin 2
 Eastsound UGA Drainage Proposal
 SJCPW



Cost Basis: June-05
 Prepared: 22-Dec-04
 Estimated: DSD
 Checked: TEM

2.1 Lover's Lane Storm Drain: Greer Lane to Waterfront Park

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 12" N-12	420	LF	\$ 49.57	\$ 20,820	
2	CB 48" Type 2	1	EA	\$ 2,602.47	\$ 2,602	
2	Shoreline SD Permits	1	LS	\$ 1,500.00	\$ 1,500	
3	Flow Splitter insert in Type 2 CB	1	LS	\$ 1,000.00	\$ 1,000	
4	Mobilization and Misc.	1	LS	\$ 3,800.00	\$ 3,800	1
Subtotal					\$ 28,722	
Contingency					20%	\$ 5,944
Sales Tax					7.7%	\$ 2,746
Estimated Construction Cost					\$ 38,413	
Engineering and Construction Inspection					20%	\$ 7,683
Estimated Project Cost					\$ 46,096	

Notes:

- 1 Highlighted unit costs are assumed.
 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.

2.2 Greer Lane Roadside Ditch Improvements

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Rock-lined Ditch-4"-12" Rip Rap	1320	LF	\$ 8.04	\$ 10,615	
2	Rock Check Dams	26	EA	\$ 100.00	\$ 2,600	
3	Ex. Utility Conflict resolution	750	LF	\$ 3.50	\$ 2,625	
#REF!	Mobilization and Misc.	1	LS	\$ 2,400.00	\$ 2,400	1
Subtotal					\$ 18,240	
Contingency					20%	\$ 3,648
Sales Tax					7.7%	\$ 1,685
Estimated Construction Cost					\$ 23,573	
Engineering And Construction Inspection					10%	\$ 2,357
Estimated Project Cost					\$ 25,930	

Notes:

- 1 Highlighted unit costs are assumed.
 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.

All

Basin 2 **\$ 72,025**

Preliminary Project Cost Estimates
 Projects Basin 3
 Eastsound UGA Drainage Proposal
 SJCPW



Cost Basis: June-05
 Prepared: 22-Dec-04
 Estimated: DSD
 Checked: TEM

3.1 Oreas Road Storm Drain and Outfall: Galley's First Add.

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 18" N-12	600	LF	\$ 55.77	\$ 33,460	
2	Storm Pipe 30" N-12	125	LF	\$ 92.95	\$ 11,618	
3	CB 48" Type.2	1	EA	\$ 2,602.47	\$ 2,602	
4	CB Type 1	2	EA	\$ 1,239.27	\$ 2,479	
5	Shoreline SD Permits	1	LS	\$ 1,500.00	\$ 1,500	
6	Biofiltration inc. topsoil/ seeding	250	LF	\$ 4.38	\$ 1,096	
7	Mobilization and Misc.	1	LS	\$ 8,300.00	\$ 8,300	1
Subtotal					\$ 81,055	
Contingency					20%	\$ 12,211
Sales Tax					7.7%	\$ 5,841
Estimated Construction Cost					\$ 78,908	
Engineering and Construction Inspection					15%	\$ 11,836
Estimated Project Cost					\$ 90,744	

Notes:

- 1 Highlighted unit costs are assumed.
- 2 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 2 Easements required, assumed donated by owner for maintenance and other considerations.

All

Basin 3 \$ 90,744

Preliminary Project Cost Estimates
 Projects Basin 4
 Eastsound UGA Drainage Proposal
 SJCPW



Cost Basis: June-05
 Prepared: 22-Dec-04
 Estimated: DSD
 Checked: TEM

4.1a&b "Mount Property" to Main Street Storm Drain

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 48" N-12	240	LF	\$ 250.00	\$ 60,000	
2	CB 72" Type 2	3	EA	\$ 6,500.00	\$ 19,500	
3	Biofiltration inc. topsoil/ seeding	240	LF	\$ 4.38	\$ 1,052	3
4	Ex. Utility Conflict resolution	150	LF	\$ 3.50	\$ 525	
5	Archeological Sites	1	LS	\$ 3,500.00	\$ 3,500	
6	Shoreline SD Permits	1	LS	\$ 1,500.00	\$ 1,500	
7	Wetland Studies	1	LS	\$ 3,500.00	\$ 3,500	
8	Field Inlet Structure	1	EA	\$ 800.00	\$ 800	
9	Connect to existing MH	1	LS	\$ 8,000.00	\$ 8,000	4
10	Easement Cost	240	LF	\$ -	\$ -	2
11	Mobilization and Misc.	1	LS	\$ 14,500.00	\$ 14,500	1
Subtotal					\$ 112,877	
Contingency					20%	\$ 22,575
Sales Tax					7.7%	\$ 10,430
Estimated Construction Cost					\$ 145,882	
Engineering and Construction Inspection					15%	\$ 21,882
Estimated Project Cost					\$ 167,764	

Notes:

- Highlighted unit costs are assumed.
- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 2 Assume 20' wide, Donated by Owner
- 3 240 LF assume 20' top width
- 4 Connection includes open trench and coring in travelled way, area requires traffic control.

4.2 "Mount Property" Stormwater Treatment Facility \$156,000

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Wetpond	1.23	LS	\$ 65,000.00	\$ 79,950	2
2	Discharge, spill control and channels	1.23	LS	\$ 19,700.00	\$ 24,231	2
3	Mobilization and Misc.	1	LS	\$ -	\$ -	1
Subtotal					\$ 104,181	
Contingency					20%	\$ 20,836
Sales Tax					7.7%	\$ 9,626
Estimated Construction Cost					\$ 134,644	
Engineering And Construction Inspection					15%	\$ 20,197
Estimated Project Cost					\$ 154,841	

Notes:

- Highlighted unit costs are assumed.
- 2 Mount Property SW Control Study 1/6/99 HPE, Collection system improvements estimated in separate projects. Cost assumes full site utilization and quantity has been adjusted to bring 1998 costs to a current basis.
- 1 Included in 1999 Estimates

4.3 "A" Street to "Mount Property" Storm Drain w/Flow Splitter

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 12" N-12	210	LF	\$ 49.57	\$ 10,410	
2	Storm Pipe 18" N-12	240	LF	\$ 55.77	\$ 13,384	

Prelim Est Basin 4

3	CB 48" Type 2	1	EA	\$ 2,602.47	\$	2,602
4	CB Type 1	2	EA	\$ 1,239.27	\$	2,479
5	Flow Splitter insert in Type 2 CB	1	LS	\$ 1,000.00	\$	1,000
6	Ex. Utility Conflict resolution	450	LF	\$ 3.50	\$	1,575
7	Trench in road, select b/f, repair, traffic	450	LF	\$ 22.00	\$	9,900
8	Mobilization and Misc.	1	LS	\$ 9,000.00	\$	9,000
	Subtotal				\$	60,350
	Contingency		20%		\$	10,070
	Sales Tax		7.7%		\$	4,652
	Estimated Construction Cost				\$	66,072
	Engineering and Construction Inspection		15%		\$	8,761
	Purchase Easement	240	LF	\$ 80.00	\$	19,200
	Estimated Project Cost				\$	74,633

Notes:

Highlighted unit costs are assumed.

1. Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
2. 10' Easement exists, SJCPW would like additional width for future access.

4.4 Eastsound Swale Bypass Storm Drain

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 42" N-12	1850	LF	\$ 180.00	\$ 333,000	
2	Storm Pipe 18" N-12	240	LF	\$ 55.77	\$ 13,384	
3	CB 72" Type 2	5	EA	\$ 6,500.00	\$ 32,500	3
4	Flow Splitter insert in Type 2 CB	4	LS	\$ 1,000.00	\$ 4,000	2
5	Ex. Utility Conflict resolution	2100	LF	\$ 3.50	\$ 7,350	
6	Mobilization and Misc.	1	LS	\$ 58,000.00	\$ 58,000	1
	Subtotal				\$ 448,234	
	Contingency		20%		\$ 89,647	
	Sales Tax		7.7%		\$ 41,417	
	Estimated Construction Cost				\$ 578,298	
	Engineering and Construction Inspection		15%		\$ 86,895	4
	Estimated Project Cost				\$ 668,192	

Notes:

Highlighted unit costs are assumed.

1. Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
2. Single splitter in large MH
3. Assume 1 MH/ 400 LF
4. Incl. Surveying for design and easement stake/recording
5. Easements required, assumed donated by owner for maintenance and other considerations.

4.5 Enchanted Forest Road Improvements

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Ditch Improvements 2'deep 2.5:1	5600	LF	\$ 8.20	\$ 45,920	
2	Rock-lined Ditch-4"-12" Rip Rap	800	LF	\$ 8.04	\$ 6,433	
3	Mobilization and Misc.	1	LS	\$ 7,700.00	\$ 7,700	1
	Subtotal				\$ 60,053	
	Contingency		20%		\$ 12,011	
	Sales Tax		7.7%		\$ 5,649	
	Estimated Construction Cost				\$ 77,613	
	Engineering and Construction Inspection		10%		\$ 7,761	
	Estimated Project Cost				\$ 85,374	

Notes:

Highlighted unit costs are assumed.

1. Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.

Prelim Est Basin 4

4.6 Fishing Bay Outfall Erosion Protection

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Outfall 10' X 10' X 1' Rip Rap	2	LS	\$ 900.00	\$ 1,800	2
1	Archeological Sites	1	LS	\$ 3,500.00	\$ 3,500	
2	Shoreline SD Permits	1	LS	\$ 1,500.00	\$ 1,500	
3	Mobilization and Misc.	1	LS	\$ 1,800.00	\$ 1,000	1
Subtotal					\$ 7,800	
Contingency				20%	\$ 1,560	
Sales Tax				7.7%	\$ 721	
Estimated Construction Cost					\$ 10,081	
Engineering and Construction Inspection				15%	\$ 1,512	
Estimated Project Cost					\$ 11,593	

Notes:

Highlighted unit costs are assumed.

- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 2 Outfall assume 10 X 20' Rip Rap 4-12'

4.7 Eastsound Swale Wetland Enhancement

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Ditch Improvements 2'deep 2.5:1	0	LF	\$ 8.20	\$ -	3
2	Biofiltration inc. topsoil/ seeding	0	LF	\$ 4.38	\$ -	3
2	Purchase Easement	0	LF	\$ 80.00	\$ -	2
3	Wetland Studies	0	LS	\$ 3,500.00	\$ -	2
4	Mobilization and Misc.	1	LS	\$ -	\$ -	1
Subtotal					\$ -	
Contingency				20%	\$ -	
Sales Tax				7.7%	\$ -	
Estimated Construction Cost					\$ -	
Engineering and Construction Inspection				20%	\$ -	
Estimated Project Cost					\$ -	

Notes:

Highlighted unit costs are assumed.

- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 2 Studies include baseline inflow and elevation correlation.
- 3 Enhancement assumed to include diversion/spreading using ditches and volume/habitat additions.
- 4 Easements required, assumed donated by owner for maintenance and other considerations.

All

Basin 4 **\$ 1,160,597**

Preliminary Project Cost Estimates
 Projects Basin 6
 Eastsound UGA Drainage Proposal
 SJCPW



Cost Basis: June-05
 Prepared: 22-Dec-04
 Estimated: DSD
 Checked: TEM

5.1 West Airport Storm Drain: Lovers Lane to North Shore

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 42" HDPE	700	LF	\$ 247.50	\$ 173,250	2
2	Ditch Improvements 2' deep 2.5:1	1900	LF	\$ 8.20	\$ 15,580	
3	Ditch Improvements 4' deep 2.5:1	2100	LF	\$ 25.00	\$ 52,500	
4	CB 48" Type 2	1	EA	\$ 2,602.47	\$ 2,602	
5	CB 72" Type 2	2	EA	\$ 6,500.00	\$ 13,000	
6	Flow Splitter Insert in Type 2 CB	2	LS	\$ 1,000.00	\$ 2,000	
7	Shoreline SD Permits	1	LS	\$ 1,500.00	\$ 1,500	
8	Wetland Studies	1	LS	\$ 3,500.00	\$ 3,500	
9	Mobilization and Misc.	1	LS	\$ 39,000.00	\$ 39,000	1
Subtotal					\$ 302,832	
Contingency					20%	\$ 60,566
Sales Tax					7.7%	\$ 27,991
Estimated Construction Cost					\$ 391,389	
Engineering and Construction Inspection					15%	\$ 58,726
Estimated Project Cost					\$ 450,236	

Notes:

- Highlighted unit costs are assumed.
- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 2 Outfall costs increased 50% for 75% length.
- 3 Easements required, assumed donated by owner for maintenance and other considerations.

5.2 Nina Lane Storm Drain

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 24" N-12	1200	LF	\$ 74.36	\$ 89,228	
2	CB 48" Type 2	1	EA	\$ 2,602.47	\$ 2,602	
3	CB Type 1L	1	EA	\$ 1,375.59	\$ 1,376	2
4	Flow Splitter insert in Type 2 CB	1	LS	\$ 1,000.00	\$ 1,000	
5	Shoreline SD Permits	1	LS	\$ 1,500.00	\$ 1,500	
6	Wetland Studies	1	LS	\$ 3,500.00	\$ 3,500	
7	Mobilization and Misc.	1	LS	\$ 14,000.00	\$ 14,000	1
Subtotal					\$ 113,206	
Contingency					20%	\$ 22,641
Sales Tax					7.7%	\$ 10,460
Estimated Construction Cost					\$ 146,307	
Engineering And Construction Inspection					15%	\$ 21,946
Estimated Project Cost					\$ 168,253	

Notes:

- Highlighted unit costs are assumed.
- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 2 Assume 1 MH/ 400 LF

5.3 East Airport Storm Drain: North Beach Road to Marina

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
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Prelim Est Basin 5

1	Storm Pipe 24" N-12	1400 LF	\$ 102.24	\$ 143,136	2
2	CB 48" Type 2	5 EA	\$ 2,602.47	\$ 13,012	
3	Ditch Improvements 2'deep 2.5:1	1200 LF	\$ 8.20	\$ 9,840	
4	Culvert 12" N-12	500 LF	\$ 19.45	\$ 11,668	
5	Purchase Easement	1400 LF	\$ 80.00	\$ 112,000	
6	Shoreline SD Permits	1 LS	\$ 1,500.00	\$ 1,500	
7	Mobilization and Misc.	1 LS	\$ 43,000.00	\$ 43,000	1
Subtotal				\$ 334,156	
Contingency 20%				\$ 66,831	
Sales Tax 7.7%				\$ 30,876	
Estimated Construction Cost				\$ 431,863	
Engineering and Construction Inspection 15%				\$ 64,779	
Estimated Project Cost				\$ 496,643	

Notes:

Highlighted unit costs are assumed.

- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 2 Outfall costs increased 50% for 75% length
- 3 Easements required, assumed donated by owner for maintenance and other considerations.

5.4 Mt. Baker Road Ditch Improv: Gibson Road to Lover's Lane

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Culvert 12" N-12	500 LF		\$ 19.45	\$ 9,723	
2	Ditch Improvements 2'deep 2.5:1	6400 LF		\$ 8.20	\$ 52,480	2
3	Mobilization and Misc.	1 LS		\$ 9,000.00	\$ 9,000	1
Subtotal				\$ 71,203		
Contingency 20%				\$ 14,241		
Sales Tax 7.7%				\$ 6,579		
Estimated Construction Cost				\$ 92,023		
Engineering and Construction Inspection 10%				\$ 9,202		
Estimated Project Cost				\$ 101,225		

Notes:

Highlighted unit costs are assumed.

- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 2 Assume cross country ditch same cost as improvement.
- 3 Easements required, assumed donated by owner for maintenance and other considerations.

5.5 Mountain View Street Ditch Improvements

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Ditch Improvements 2'deep 2.5:1	600 LF		\$ 8.20	\$ 4,920	
2	Culvert 12" N-12	350 LF		\$ 19.45	\$ 6,806	
3	Mobilization and Misc.	1 LS		\$ 3,500.00	\$ 3,500	1
Subtotal				\$ 15,226		
Contingency 20%				\$ 3,045		
Sales Tax 7.7%				\$ 1,407		
Estimated Construction Cost				\$ 19,678		
Engineering and Construction Inspection 10%				\$ 1,968		
Estimated Project Cost				\$ 21,646		

Notes:

Highlighted unit costs are assumed.

- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.

5.6 Blanchard Road Ditch Improvements: Nina Lane to Bunny Lane

Item	Item	Quantity	Unit	Unit Cost	Amount	Notes
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Prelim Est Basin 5

No.			(adjusted)			
1	Culvert 18" N-12	100 LF	\$ 36.76	\$	3,676	2
2	Ditch Improvements 2'deep 2.5:1	500 LF	\$ 8.20	\$	4,100	
3	Mobilization and Misc.	1 LS	\$ 1,200.00	\$	1,200	1
	Subtotal			\$	8,976	
	Contingency	20%		\$	1,795	
	Sales Tax	7.7%		\$	829	
	Estimated Construction Cost			\$	11,600	
	Engineering and Construction Inspection	10%		\$	1,160	
	Estimated Project Cost			\$	12,760	

Notes:

Highlighted unit costs are assumed.

- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 2 Outfall assume 10 X 20' Rip Rap 4-12'

5.7 North Beach Road Ditch Improvements: to Shady Lane

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Ditch Improvements 2'deep 2.5:1	2000 LF		\$ 8.20	\$ 16,400	
2	Culvert 12" N-12	600 LF		\$ 19.45	\$ 11,668	
3	Mobilization and Misc.	1 LS		\$ 6,800.00	\$ 6,800	1
	Subtotal				\$ 34,868	
	Contingency	20%			\$ 6,974	
	Sales Tax	7.7%			\$ 3,222	
	Estimated Construction Cost				\$ 45,063	
	Engineering and Construction Inspection	10%			\$ 4,506	
	Estimated Project Cost				\$ 48,569	

Notes:

Highlighted unit costs are assumed.

- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.

5.8 Twiggs Lane Ditch Improvements

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Culvert 12" N-12	150 LF		\$ 19.45	\$ 2,917	
2	Ditch Improvements 2'deep 2.5:1	1000 LF		\$ 8.20	\$ 8,200	
3	Mobilization and Misc.	1 LS		\$ 2,300.00	\$ 2,300	1
	Subtotal				\$ 13,417	
	Contingency	20%			\$ 2,683	
	Sales Tax	7.7%			\$ 1,240	
	Estimated Construction Cost				\$ 17,340	
	Engineering and Construction Inspection	10%			\$ 1,734	
	Estimated Project Cost				\$ 18,074	

Notes:

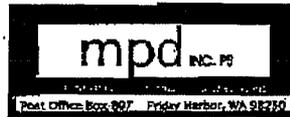
Highlighted unit costs are assumed.

- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.

All

Basin 5 **\$ 1,319,407**

Preliminary Project Cost Estimates
Projects Basin 6
 Eastsound UGA Drainage Proposal
 SJCPW



Cost Basis: June-05
 Prepared: 22-Dec-04
 Estimated: DSD
 Checked: TEM

6.1 North Beach Road Storm Drain

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 12" N-12	1100	LF	\$ 61.96	\$ 68,160	
2	Storm Pipe 18" N-12	750	LF	\$ 55.77	\$ 41,825	2
3	CB Type 1	6	EA	\$ 1,239.27	\$ 7,436	
4	CB 48" Type 2	1	EA	\$ 2,602.47	\$ 2,602	
5	18" Tide gate and Trash Rack	1	EA	\$ 3,000.00	\$ 3,000	
6	Shoreline SD Permits	1	LS	\$ 1,500.00	\$ 1,500	
7	Ex. Utility Conflict resolution	800	LF	\$ 3.50	\$ 2,800	
8	Mobilization and Misc.	1	LS	\$ 18,500.00	\$ 18,500	1
Subtotal					\$ 146,823	
Contingency					20%	\$ 29,165
Sales Tax					7.7%	\$ 13,474
Estimated Construction Cost					\$ 188,462	
Engineering and Construction Inspection					15%	\$ 28,269
Estimated Project Cost					\$ 216,732	

Notes:

- Highlighted unit costs are assumed.
- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 2 Outfall costs increased 50% for 50% length

6.2a Spruce, Alder and Hemlock Streets Storm Drain \$287,000

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 12" N-12	3200	LF	\$ 49.57	\$ 158,627	
2	CB Type 1	14	EA	\$ 1,239.27	\$ 17,350	
3	Ex. Utility Conflict resolution	3200	LF	\$ 3.50	\$ 11,200	
4	Mobilization and Misc.	1	LS	\$ 28,000.00	\$ 28,000	1
Subtotal					\$ 215,177	
Contingency					20%	\$ 43,035
Sales Tax					7.7%	\$ 19,862
Estimated Construction Cost					\$ 278,094	
Engineering And Construction Inspection					15%	\$ 41,714
Estimated Project Cost					\$ 319,808	

Notes:

- Highlighted unit costs are assumed.
- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 2 Assumed costs of increased trench depth to 20' max.

6.2b Sunset Avenue Storm Drain \$110,100

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 12" N-12	1200	LF	\$ 49.57	\$ 59,485	
2	CB Type 1	6	EA	\$ 1,239.27	\$ 7,436	
3	Ex. Utility Conflict resolution	1200	LF	\$ 3.50	\$ 4,200	
4	Shoreline SD Permits	1	LS	\$ 1,500.00	\$ 1,500	
5	Mobilization and Misc.	1	LS	\$ 10,500.00	\$ 10,500	1

Prelim Est Basin 6

Subtotal		\$	83,121
Contingency	20%	\$	16,624
Sales Tax	7.7%	\$	7,680
Estimated Construction Cost		\$	107,425
Engineering and Construction Inspection	15%	\$	16,114
Estimated Project Cost		\$	123,539

Notes:

- 1 Highlighted unit costs are assumed.
Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.

6.3	Bartal Street Storm Drain	\$115,000					
Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes	
1	Storm Pipe 12" N-12	1200	LF	\$ 49.57	\$ 59,485		
2	CB Type 1	6	EA	\$ 1,239.27	\$ 7,436		
3	Ditch Improvements 2'deep 2.5:1	600	LF	\$ 8.20	\$ 4,920		
4	Mobilization and Misc.	1	LS	\$ 10,500.00	\$ 10,500	1	
	Subtotal				\$ 82,341		
	Contingency		20%		\$ 16,468		
	Sales Tax		7.7%		\$ 7,608		
	Estimated Construction Cost				\$ 106,417		
	Engineering and Construction Inspection		15%		\$ 15,963		
	Estimated Project Cost				\$ 122,380		

Notes:

- 1 Highlighted unit costs are assumed.
Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.

All

Basin 6

\$ 782,459

Preliminary Project Cost Estimates
Projects Basin 7
Eastsound UGA Drainage Proposal
SJCPW



Cost Basis: June-05
 Prepared: 22-Dec-04
 Estimated: DSD
 Checked: TEM

7.1 Terrill Beach Road Storm Drain and Outfall

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Outfall 60" HDPE w/ Concr. Anchors	200	LF	\$ 450.00	\$ 90,000	
2	Storm Pipe 60" N-12	600	LF	\$ 310.00	\$ 186,000	
3	Storm Pipe 48" N-12	1000	LF	\$ 250.00	\$ 250,000	
4	CB 72" Type 2	3	EA	\$ 6,500.00	\$ 19,500	
5	CB 60" Type 2	1	EA	\$ 5,948.51	\$ 5,949	
6	Flow Splitter insert in Type 2 CB	2	LS	\$ 1,000.00	\$ 2,000	
7	Shoreline SD Permits	1	LS	\$ 1,500.00	\$ 1,500	
8	Wetland Studies	1	LS	\$ 3,500.00	\$ 3,500	
9						
10	Mobilization and Misc.	1	LS	\$ 83,000.00	\$ 83,000	1
	Subtotal				\$ 641,449	
	Contingency		20%		\$ 128,290	
	Sales Tax		7.7%		\$ 59,270	
	Estimated Construction Cost				\$ 828,008	
	Engineering and Construction Inspection		15%		\$ 124,351	
	Estimated Project Cost				\$ 953,359	

Notes:

- 1 Highlighted unit costs are assumed.
 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.

7.2 Terrill Beach Wetland Enhancement

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Ditch Improvements 2'deep 2.5:1		D LF	\$ 8.20	\$ -	
2	Biofiltration inc. topsoil/ seeding		D LF	\$ 4.38	\$ -	
3	Purchase Easement				\$ -	
4					\$ -	
5					\$ -	
6	Wetland Studies		D LS	\$ 3,500.00	\$ -	
7	Mobilization and Misc.	0	LS	\$ 14,000.00	\$ -	1
	Subtotal				\$ -	
	Contingency		20%		\$ -	
	Sales Tax		7.7%		\$ -	
	Estimated Construction Cost				\$ -	
	Engineering And Construction Inspection		15%		\$ -	
	Estimated Project Cost				\$ -	

Notes:

- 1 Highlighted unit costs are assumed.
 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 2 Easements required, assumed donated by owner for maintenance and other considerations.

7.3 Terrill Beach Road and Mt. Baker Road Ditch Improvements

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
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Prelim Est Basin 7

1	Ditch Improvements 2'deep 2.5:1	4800 LF	\$	8.20	\$	39,360
2	Culvert 12" N-12	200 LF	\$	19.45	\$	3,889
3	Mobilization and Misc.	1 LS	\$	6,400.00	\$	6,400
	Subtotal				\$	49,649
	Contingency	20%			\$	9,930
	Sales Tax	7.7%			\$	4,588
	Estimated Construction Cost				\$	64,167
	Engineering and Construction Inspection	10%			\$	6,417
	Estimated Project Cost				\$	70,583

Notes:

- 1 Highlighted unit costs are assumed.
- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.

All

Basin 7

\$ 1,023,943

Prelim Est Basin 8

Preliminary Project Cost Estimates
 Projects Basin 8
 Eastsound UGA Drainage Proposal
 SJCPW



Cost Basis: June-05
 Prepared: 22-Dec-04
 Estimated: DSD
 Checked: TEM

8.1 Ship Bay Outfall Improvement

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Outfall 48" HDPE w/ Concr. Anchors	200	LF	\$ 375.00	\$ 75,000	
2	Outfall 10' X 10' X 1' Rip Rap	10	LS	\$ 900.00	\$ 9,000	3
3	Special Anchorages	1	LS	\$ 25,000.00	\$ 25,000	
4	Shoreline SD Permits	3	LS	\$ 1,500.00	\$ 4,500	2
5	Mobilization and Misc.	1	LS	\$ 17,000.00	\$ 17,000	1
Subtotal					\$ 130,500	
Contingency					20%	\$ 26,100
Sales Tax					7.7%	\$ 12,058
Estimated Construction Cost					\$ 168,658	
Engineering and Construction Inspection					20%	\$ 33,732
Easement Purchase					220 LF	\$ 17,600
Estimated Project Cost					\$ 202,390	

Notes:

- Highlighted unit costs are assumed.
- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 2 Hydraulic Permitting & beach work
- 3 Assume 500 SF on the beach

8.2 Olga Road and Ship Bay Ditch Improvements

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Culvert 48" N-12	40	LF	\$ 220.00	\$ 8,800	
2	Ditch Improvements 2'deep 2.5:1	450	LF	\$ 8.20	\$ 3,690	
3	Shoreline SD Permits	1	LS	1500	\$ 1,500	
4	Purchase Easement	450	LF	\$ 40.00	\$ 18,000	2
5	Mobilization and Misc.	1	LS	\$ 2,500.00	\$ 2,500	1
Subtotal					\$ 34,490	
Contingency					20%	\$ 6,898
Sales Tax					7.7%	\$ 3,197
Estimated Construction Cost					\$ 44,576	
Engineering and Construction Inspection					10%	\$ 4,457
Estimated Project Cost					\$ 49,032	

Notes:

- Highlighted unit costs are assumed.
- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 2 10' wide ditch easement

All

Basin 8 **\$ 251,422**

Preliminary Project Cost Estimates
Projects: Basin 9
Eastsound UGA Drainage Proposal
SJCPW



Cost Basis: June-05
 Prepared: 22-Dec-04
 Estimated: DSD
 Checked: TEM

8.1 Montgomery Lane to Crescent Beach Storm Drain \$108,000

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 18" N-12	500	LF	\$ 55.77	\$ 27,884	
2	Storm Pipe 48" N-12	100	LF	\$ 375.00	\$ 37,500	2.00
3	CB-48" Type 2	1	EA	\$ 2,602.47	\$ 2,602	
4	CB 72" Type 2	1	EA	\$ 6,500.00	\$ 6,500	
5	48" Tide gate and Trash Rack	1	EA	\$ 10,000.00	\$ 10,000	
6	Archeological Sites	1	LS	\$ 3,500.00	\$ 3,500	
7	Field Inlet Structure	1	EA	\$ 800.00	\$ 800	
8	Mobilization and Misc.	1	LS	\$ 12,000.00	\$ 12,000	1
Subtotal					\$ 100,786	
Contingency					20%	\$ 20,157
Sales Tax					7.7%	\$ 9,313
Estimated Construction Cost					\$ 130,256	
Engineering and Construction Inspection					15%	\$ 19,538
Estimated Project Cost					\$ 148,784	

Notes:

- 1 Highlighted unit costs are assumed.
- 2 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 3 Outfall costs increased 50%

9.2 Montgomery Lane Conveyance Improvement \$110,100

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 12" N-12	1000	LF	\$ 49.57	\$ 49,571	
2	CB Type 1	3	EA	\$ 1,239.27	\$ 3,718	
2	Biofiltration inc. topsoil/ seeding	1000	LF	\$ 4.38	\$ 4,382	
3	Mobilization and Misc.	1	LS	\$ 8,500.00	\$ 8,500	1
Subtotal					\$ 66,171	
Contingency					20%	\$ 13,234
Sales Tax					7.7%	\$ 6,114
Estimated Construction Cost					\$ 85,519	
Engineering and Construction Inspection					10%	\$ 8,552
Estimated Project Cost					\$ 94,071	

Notes:

- 1 Highlighted unit costs are assumed.
- 2 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.

All

Basin 9 **\$ 243,856**

Preliminary Project Cost Estimates
Projects Basin 10
Eastsound UGA Drainage Proposal
SJCPW



Cost Basis: June-05
 Prepared: 22-Dec-04
 Estimated: DSD
 Checked: TEM

10.1 Buck Property Storm Drain

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 24" N-12	1100	LF	\$ 74.36	\$ 81,792	
2	Storm Pipe 18" N-12	600	LF	\$ 55.77	\$ 33,460	
3	CB 48" Type 2	5	EA	\$ 2,602.47	\$ 13,012	
4	Flow Splitter insert in Type 2 CB	1	LS	\$ 1,000.00	\$ 1,000	
5	Shoreline SD Permits	1	LS	\$ 1,500.00	\$ 1,500	
6	Wetland Studies	1	LS	\$ 3,500.00	\$ 3,500	
7	Mobilization and Misc.	1	LS	\$ 19,800.00	\$ 19,800	1
Subtotal					\$ 154,066	
Contingency					20%	\$ 30,813
Sales Tax					7.7%	\$ 14,236
Estimated Construction Cost					\$ 199,113	
Engineering and Construction Inspection					15%	\$ 29,867
Estimated Project Cost					\$ 228,980	

Notes:

- Highlighted unit costs are assumed.
- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 2 Easements required, assumed donated by owner for maintenance and other considerations.

10.2 Bracken Fern Lane Storm Drain

Item No.	Item	Quantity	Unit	Unit Cost (adjusted)	Amount	Notes
1	Storm Pipe 36" N-12	1200	LF	\$ 123.93	\$ 148,713	
2	Storm Pipe 24" N-12	650	LF	\$ 74.36	\$ 48,332	
3	Storm Pipe 18" N-12	1100	LF	\$ 55.77	\$ 61,344	
4	Storm Pipe 12" N-12	800	LF	\$ 49.57	\$ 39,657	
5	CB 54" Type 2	4	EA	\$ 3,965.67	\$ 15,863	
6	CB 48" Type 2	9	EA	\$ 2,602.47	\$ 23,422	
7	Flow Splitter insert in Type 2 CB	1	LS	\$ 1,000.00	\$ 1,000	
8	Shoreline SD Permits	1	LS	\$ 1,500.00	\$ 1,500	
9	Wetland Studies	1	LS	\$ 3,500.00	\$ 3,500	
10	Mobilization and Misc.	1	LS	\$ 51,000.00	\$ 51,000	1
Subtotal					\$ 394,380	
Contingency					20%	\$ 78,866
Sales Tax					7.7%	\$ 36,436
Estimated Construction Cost					\$ 509,632	
Engineering And Construction Inspection					15%	\$ 76,445
Estimated Project Cost					\$ 586,077	

Notes:

- Highlighted unit costs are assumed.
- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.
- 2 Easements required, assumed donated by owner for maintenance and other considerations.

10.3 Crescent Beach Overflow Outfall

Item	Item	Quantity	Unit	Unit Cost	Amount	Notes
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Prelim Est Basin 10

No.			(adjusted)		
1	Outfall 18" HDPE w/ Concr. Anchors	200 LF	\$ 83.65	\$	16,730
2	18" Tide gate and Trash Rack	1 EA	\$ 3,000.00	\$	3,000
3	Archeological Sites	1 LS	\$ 3,500.00	\$	3,500
4	Shoreline SD Permits	1 LS	\$ 1,500.00	\$	1,500
5	Wetland Studies	1 LS	\$ 3,500.00	\$	3,500
6	Mobilization and Misc.	1 LS	\$ 3,500.00	\$	3,500
	Subtotal			\$	21,730
	Contingency	20%		\$	6,346
	Sales Tax	7.7%		\$	2,932
	Estimated Construction Cost			\$	41,008
	Engineering And Construction Inspection	15%		\$	6,151
	Estimated Project Cost			\$	47,159

Notes:

- 1 Highlighted unit costs are assumed.
- 1 Mob and Misc assumed to be roughly 10% construction cost incl. Contingency.

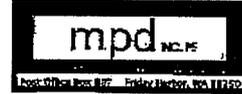
All

Basin 10

\$ 862,216

Unit Costs
 Eastsound UGA Drainage Proposal
 SJC/PW

Cost Basis: June-05
 Prepared: 12/22/2004 15:09



Estimated: DSD
 Checked: TEM

Category	Item	Quantity	Unit	Unit Cost (adjusted)	Unit Cost (bid)	Date	Time (years)
Catch Basins	CB Type 1		EA	\$ 1,239.27	\$1,000.00	March-98	7.26
	CB Type 1L		EA	\$ 1,375.59	\$1,110.00	March-98	7.26
	CB 48" Type 2		EA	\$ 2,802.47	\$2,100.00	March-98	7.26
	CB 54" Type 2		EA	\$ 3,965.67	\$3,200.00	March-98	7.26
	CB 60" Type 2		EA	\$ 5,048.51	\$4,800.00	March-98	7.26
	CB 72" Type 2		EA	\$ 6,500.00			
Storm Pipe	Storm Pipe 12" N-12		LF	\$ 49.57	\$40.00	March-98	7.26
	Storm Pipe 18" N-12		LF	\$ 55.77	\$45.00	March-98	7.26
	Storm Pipe 24" N-12		LF	\$ 74.36	\$60.00	March-98	7.26
	Storm Pipe 30" N-12		LF	\$ 92.95	\$75.00	March-98	7.26
	Storm Pipe 36" N-12		LF	\$ 123.93	\$100.00	March-98	7.26
	Storm Pipe 42" N-12		LF	\$ 160.00			
	Storm Pipe 48" N-12		LF	\$ 250.00			
	Storm Pipe 60" N-12		LF	\$ 310.00			
	Outfall 18" HDPE w/ Concr. Anchors		LF	\$ 83.65			
	Outfall 48" HDPE w/ Concr. Anchors		LF	\$ 325.00			
	Outfall 60" HDPE w/ Concr. Anchors		LF	\$ 450.00			
	Culverts	Culvert 12" N-12		LF	\$ 19.45	\$17.75	May-02
Culvert 18" N-12			LF	\$ 36.76	\$33.55	May-02	3.09
Culvert 24" N-12			LF	\$ 70.00			
Culvert 48" N-12			LF	\$ 220.00			
Swale:	Biofiltration inc. topsoil/ seeding		LF	\$ 4.38	\$4.00	May-02	3.09
	Rock-lined Ditch-4"-12" Rip Rap		LF	\$ 8.04	\$7.34	May-02	3.09
	Rock Check Dams		EA	\$ 100.00			
Special Cond.:	Outfall 10' X 10' X 1' Rip Rap		LS	\$ 500.00			
	Trench Safety > 4' depth, < 8'		LF	\$ 1.24	\$1.00	March-98	7.26
	Trench Safety > 8' depth, < 12'		LF	\$ 7.00			
	Trench Safety > 12' depth, < 20'		LF	\$ 19.00			
	Ditch Improvements 2' deep 2.5:1		LF	\$ 58.20			
	18" Tide gate and Trash Rack		EA	\$ 3,000.00			
	24" Tide gate and Trash Rack		EA	\$ 4,000.00			
	30" Trash Rack		EA	\$ 1,000.00			
	48" Tide gate and Trash Rack		EA	\$ 10,000.00			
	Field Inlet Structure		EA	\$ 500.00			
	Flow Splitter insert in Type 2 CB		LS	\$ 1,000.00			
	Trench in road, select b/f, repair, traffic		LF	\$ 22.00	500 LF 4.1; 220 LF 1.1		
Exc. Utility Conflict resolution		LF	\$ 13.50	13, 4.1, 4.5, 7.1, 1.2, 1.6, 1.4, 1.5, 4.4, 6.1, 6.2a, 6.2b			
Purchase Easement		LF	\$ 80.00				
Special Admin:	Archaeological Sites		LS	\$ 3,500.00	4.1, 4.6, 9.1, 10.3		
	Shoreline SD Permits		LS	\$ 1,500.00	4.1, 8.1, 4.6, 5.1, 5.3, 6.1, 6.2b, 3.1, 7.1, 10.1, 2.1, 3.1, 5.2, 3.2, 10.3		
	Wetland Studies		LS	\$ 3,500.00	4.1, 4.7, 5.1, 5.2, 10.1, 10.2a, 10.2b, 10.9, 7.1, 7.2		

Bid Tab Sources:

March-98 Malcolm St. SD Impr. Project, Town of Friday Harbor, Eng Est., confirmed with Low and 2nd Low unit costs.

May-02 Deer Harbor Road Relocation Bid Tab, SJC/PW, single local bidder. Means Sitework, systems

Assumed

Assumptions: Affected project list HPE, 11/16/04

- Adjusted costs in current, 2005 dollars.
- Inflation Adjustment= 3% per year, based on 10 year average construction cost inflation, ENR CC index.
- Assumed average MH depth = 8'. Pipe depth is dia. + 2' cover.
- Assume 8' width @ SF/ LF unit cost was per SY

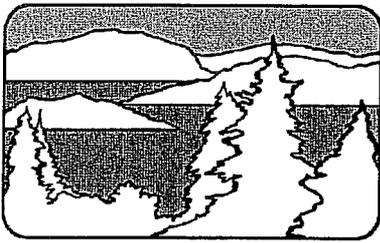
EXHIBIT B

Ordinance -2008 SIX YEAR STORMWATER CAPITAL IMPROVEMENT PLAN (2008-2013) ם ןוּוּחֵא ןוּוּחֵא ןוּוּחֵא

All dollar figures are shown in thousands of dollars. Projects shown in **BOLD** include outside funding.

Item #	Project #	LOC	PROJECT	6-Yr. Total	YEAR CONSTRUCTION SCHEDULED							COMMENTS	
					2008	2009	2010	2011	2012	2013			
1	ST0805	ES	Mount Property to Main Street Stormdrain Improvement (4.1)	\$218	\$208	\$10							Funding is Public Facilities Improvement Fund
2	ST0901	ES	Mount Property Treatment System (4.2)	\$259	\$208	\$25	\$209						Multiple design alternatives
3	ST0902	ES	Rose Street Improvements	\$154	\$154								Prior Construction Agreement
4	ST0903	ES	A Street to Mount Property Phase 1 Catch Basin to Swale (4.3)	\$25	\$25								Prior Construction Agreement
5	ST1201	ES	A Street to Mount Property Phase 2 Catch Basin to Mount (4.3)	\$85						\$85			
6	ST0904	ES	North Beach Road Storm Drain Shady Lane North (6.1)	\$275	\$275								
7	ST0905	ES	Twigs Lane	\$35	\$35								Development ready
8	ST0910	ES	North Beach Road Storm Drain Shady Lane South(5.7)	\$63	\$63								
9	ST1013	ES	Spruce Street (6.2a)	\$125		\$125							
10	ST1014	ES	Alder Street (6.2a)	\$125		\$125							
11	ST1015	ES	Hemlock Street (6.2a)	\$125		\$125							
12	ST1016	ES	Sunset Avenue (6.2b)	\$156		\$156							
13	ST1017	ES	Bartel road (6.3)	\$160		\$160							
14	ST1202	ES	Ship Bay Outfall Improvements (8.1)	\$223					\$223				
15	ST1203	ES	Prune Alley to Mount Street (1.1)	\$81					\$81				
16	ST1301	ES	Pine Street (1.4)	\$99							\$99		
17													
18													
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TOTAL FUNDS				\$2,208	\$208	\$587	\$716	\$209	\$389	\$99			
OUTSIDE FUNDS				\$208	\$208	\$0	\$0	\$0	\$0	\$0	\$0		
STORMWATER UTILITY FUNDS				\$2,000	\$0	\$587	\$716	\$209	\$389	\$99			

*Approved at the 6/11/08 PC Mtg.
as submitted LG!*



SAN JUAN COUNTY PLANNING COMMISSION

MINUTES OF THE MAY 19, 2008 MEETING

The meeting of the San Juan County Planning Commission was called to order by Chair, Bob Gamble, at 8:35 a.m. in the Islander's Bank Annex meeting room, Friday Harbor, San Juan Island.

Members Present: Bob Gamble, Karin Agosta, Brian Ehrmantraut, Lovel Pratt, and Mike Kaill.

Members Excused: Stephen Adams, Teri Williams, and Barbara Thomas

Community Development
And Planning Department

Staff Present: Ron Henrickson, Director; Colin Maycock, Senior Planner; Shannon FitzGerald, Senior Planner; Allen Shayo, Permit Coordinator; and Lynda Guernsey, DAI.

Other Staff Present: Ed Hale, Utility Manager for San Juan County Public Works.

Administrative Items

Update from Chair, Bob Gamble –

1. Vacation schedules were noted by Bob Gamble, out June 17th through June 25th, and by Karin Agosta, out May 29th through June 12th.
2. Lynda stated to the Planning Commission the items to be on the June 20th agenda.

Update from Ron Henrickson, Director of San Juan County Community Development and Planning -

1. Howie Rosenfeld, County Council member, is moving forward on finding a Friday Harbor representative to serve on the Planning Commission.
2. A petition was sent to the Growth Management Hearings Board from Dorothy Austin, declaring invalidity in regards to a lack of utility infrastructure in the Eastsound Urban Growth Area. A plan from the Eastsound Sewer district as been submitted and the plan will be presented on May 22. A 90 day extension has been applied for and compliance could be granted by the end of the extension period. Ed Sutton of the Sewer Board did a good job of getting the plan completed.
3. Ron handed out an update on upcoming Land Use items that will be coming forward as scheduling permits. It is a very long list of items and it will be almost impossible to get them all done.

Housing Bank update, Brian Ehrmantraut –

1. The Housing Bank will be looking forward to working with the Planning Commission on the Housing Element when it comes forward. Ron mentioned that it will be a couple of months before that happens. Lovel, Karin, and Bob said that they would be willing to participate on a subcommittee when the time comes.

Marine Resources Committee Update, Mike Kaill –

1. Money has been made available for a rockfish survey administered through SeaDoc.
2. The water quality issue of detergent being found in our harbor water made the KOMO-TV news. Sumps for the storm drains are being obtained. A kit has been purchased by the Town of Friday Harbor to help pin point where the detergent is coming from.

Minutes of April 4, 2008 –

Moved by Karin Agosta, seconded by Brian Ehrmantraut, to approve as submitted. Motion passed with three yes votes, and two abstentions (Agosta and Pratt).

Minutes of April 9, 2008 –

Moved by Karin Agosta, seconded by Brian Ehrmantraut, to approve the minutes as submitted. Motion passed with three yes votes and two abstentions (Pratt and Kaill).

Public hearing and deliberations on the Burn Timber Open Space application, Waldron Island, File No. 07TOS006

In regards to conflict of interest and appearance of fairness, Bob Gamble stated that he was acquainted with the family. The Planning Commission had no issues with this information nor did any members of the public.

Shannon Fitzgerald, Senior Planner, summarized her staff report dated May 13, 2008, and responded to questions from the Planning Commission.

There was no agent or applicant to speak.

Public testimony was opened and the following spoke:

Jack Cory, Island Guardian

Public testimony was closed. Shannon had no further information for the Planning Commission and they had no further questions for her.

Deliberations

Moved by Karin Agosta, seconded by Lovel Pratt, to recommend approval of the application per the staff report, including Findings, Conclusions, and Recommendations, with a new condition #3 which would have the same language as had been used in the Richman previous timber open space application regarding wetlands. Also a new condition #4 that would add to the reference list the San Juan County Noxious Weed Control Board. Motion passed unanimously.

Public hearing and deliberations to consider amending the San Juan County Comprehensive Plan to include a new Appendix 10 titled “The Long Range Drainage Plan for Eastsound Village Urban Growth Area” and 6 and 20 year updated Capital Improvement Plans

Colin Maycock summarized his staff report dated May 7, 2008 and responded to questions from the Planning Commission. Ron Henrickson supplied additional information as did Ed Hale, Utility Manager for Public Works, both also responded to questions.

Public testimony was opened and, as no one spoke, closed.

Ron responded to additional questions, and deliberations began

Deliberations

Moved by Lovel Pratt, seconded by Mike Kaill, to recommend with profound reservations, the adoption of a new Appendix 10 to the San Juan County Comprehensive Plan titled “Long Range Drainage Plan for Eastsound Village Urban Growth Area” and associated updated 6 and 20 year Capital Improvement Plans.

We find the goals and procedures expressed in Sections A Introductions, B Evaluation Methods, and C Recommended Programs, to be appropriate and worthy.

We also find that the project details of Section D Basin Analysis, fail to meet or support Sections A, B, ;and C, particularly with reference to science-based management programs and low impact development.

Therefore, we recommend that:

1. Projects in the Long Range Drainage Plan for Eastsound Village Urban Growth Area and associated updated 6 and 20 year Capital Improvement Plans be undertaken only with basin-wide analysis and recommendation based on science based stormwater management programs and low impact development as discussed on pages 9 and 10 of the plan.
2. The Planning Commission recommends that Eastsound Stormwater Capital Improvement projects secure sufficient easements for non-motorized trails regardless of current funding availability for trial construction.
3. The Planning Commission recommends that the 5th bullet of the Science Based Stormwater Management Programs section on page 10 read: "Introduce new concepts, technologies, and objectives for stormwater management such as multifunctional landscape features that mimic or replicate hydrologic functions and maintain the ecological/biological integrity of receiving streams and encourage critical aquifer recharge. These features include bioretention and conservation areas and swales.

The motion was tabled due to deliberations being closed to reopen public testimony.

Deliberations were closed and public testimony was reopened.

The following spoke:

Jack Cory, Island Guardian

Public testimony was closed and the Planning Commission returned to deliberations.

Return to Deliberations

The motion that had been tabled was reread. The original second of the motion, Mike Kaill, withdrew his second. The motion was remade and the second became Karin Agosta. It is stated again as:

Moved by Lovel Pratt, seconded by Mike Kaill, to recommend with profound reservations, the adoption of a new Appendix 10 to the San Juan County Comprehensive Plan titled "Long Range Drainage Plan for Eastsound Village Urban Growth Area" and associated updated 6 and 20 year Capital Improvement Plans.

We find the goals and procedures expressed in Sections A Introductions, B Evaluation Methods, and C Recommended Programs, to be appropriate and worthy.

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encourage critical aquifer recharge. These features include bioretention and conservation areas and swales.

Also, we recommend a new Finding E. that reads: The Long Range Drainage Plan for Eastsound Village UGA has been reviewed by the EPRC over the past three years and public comment has been strongly in support of Low Impact Development and Best Available Science, in contrast with the traditional pipe and transport conveyance currently in Section D.

Roll call vote. Lovel Pratt – yes; Brian Ehrmantraut – yes; Mike Kaill – yes; Karin Agosta – yes; and Bob Gamble – yes. Motion passed unanimously.

Review of 2008 Docket List

Ron Henrickson explained the revised docket documents handed out today and introduced Allen Shayo, Permit Coordinator, who has been assigned to prioritizing work on the docket list.

Discussion of priority list.

Mike Kaill brought forward a discussion of putting desalinization on the docket, to be reviewed as an allowable use for new development. It was suggested that he check with Shireene Hale, Senior Planner, who is currently working with the Critical Areas Ordinance, to see if that issue had arisen in their discussions and to check with the Health Department on the status of that issue within their realm. It was agreed upon by consensus, that Mike would, after checking with both the Health Department and Shireene, bring their suggestions on how best to proceed to get this issue out to the County, forward to the Planning Commission at their next meeting.

Moved by Lovel Pratt, seconded by Brian Ehrmantraut, to add as a new #42 to the list of 2008 Docket Priority Items, Exhibit C; Item 1. from page 5 of Exhibit B, In Comp Plan “Housing Element” establish a method to permit Transfer of Development Rights (TDR). Motion passed with three yes votes, one no vote (Agosta) and one abstention (Kaill).

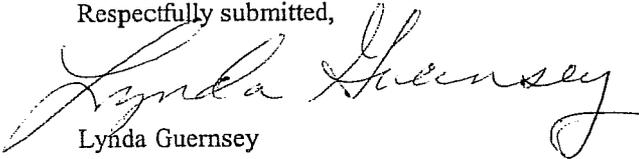
Moved by Lovel Pratt, seconded by Karin Agosta, to add as a new #43 to the list of 2008 Docket Priority Items, Exhibit C; if qualified, a recommendation in progress regarding Transient Rentals and the cumulative impacts on individual neighborhoods. Motion passed unanimously.

Moved by Lovel Pratt, seconded by Brian Ehrmantraut, to add as a new #44 to the list of 2008 Docket Priority Items, Exhibit C; Item 6. from page 16 of Exhibit B, Request to adopt ordinance to regulate “light pollution”. Motion passed unanimously.

Adjournment

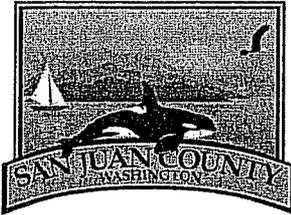
Moved and seconded to adjourn the meeting at 11:25 a.m. The next regular meeting of the Planning Commission is scheduled for June 20, 2008.

Respectfully submitted,



Lynda Guernsey

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San Juan County Planning Commission

FINDINGS AND RECOMMENDATIONS

HEARING DATE: May 19, 2008

SUBJECT: Amendment to the San Juan County Comprehensive Plan to include a new Appendix 10 titled "The Long Range Drainage Plan for Eastsound Village Urban Growth Area" and 6 and 20 year updated Capital Improvement Plans

APPLICANT: San Juan County

LOCATION: Eastsound Village UGA, San Juan County

COMMISSION MEMBERS PARTICIPATING: Bob Gamble, Karin Agosta, Brian Ehrmantraut, Lovel Pratt, and Mike Kaill

COMMUNITY DEVELOPMENT AND PLANNING RECOMMENDATION: Approval

PLANNING COMMISSION RECOMMENDATION: Approval with reservation

FINDINGS AND CONCLUSIONS:

- A. The Long Range Drainage Plan for Eastsound UGA contains an inventory and analysis of existing public facilities and services.
- B. The Long Range Drainage Plan for Eastsound UGA contains a forecast of future needs as well as the proposed locations and capacities for expanded or new capital facilities and problem specific projects.
- C. The updated 6 year capital improvement plan details both costs and projects that are expected to be constructed within the next 6 years.
- D. The updated 20 year capital improvement plan details costs and projects that are expected to be constructed over the planning horizon.
- E. The Long Range Drainage Plan for Eastsound Village UGA has been reviewed by the EPRC over the past three years and public comment has been strongly in support of Low Impact

Development and Best Available Science, in contrast with the traditional pipe and transport conveyance currently in Section D.

RECOMMENDATION:

Based on the above findings and conclusions, the San Juan County Planning Commission hereby recommends approval with the following recommendation:

Moved by Lovel Pratt, seconded by Mike Kaill, to recommend with profound reservations, the adoption of a new Appendix 10 to the San Juan County Comprehensive Plan titled “Long Range Drainage Plan for Eastsound Village Urban Growth Area” and associated updated 6 and 20 year Capital Improvement Plans.

We find the goals and procedures expressed in Sections A Introductions, B Evaluation Methods, and C Recommended Programs, to be appropriate and worthy.

We also find that the project details of Section D Basin Analysis, fail to meet or support Sections A, B, ;and C, particularly with reference to science-based management programs and low impact development.

Therefore, we recommend that:

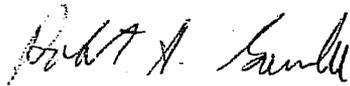
1. Projects in the Long Range Drainage Plan for Eastsound Village Urban Growth Area and associated updated 6 and 20 year Capital Improvement Plans be undertaken only with basin-wide analysis and recommendation based on science based stormwater management programs and low impact development as discussed on pages 9 and 10 of the plan.
2. The Planning Commission recommends that Eastsound Stormwater Capital Improvement projects secure sufficient easements for non-motorized trails regardless of current funding availability for trial construction.
3. The Planning Commission recommends that the 5th bullet of the Science Based Stormwater Management Programs section on page 10 read: “Introduce new concepts, technologies, and objectives for stormwater management such as multifunctional landscape features that mimic or replicate hydrologic functions and maintain the ecological/biological integrity of receiving streams and encourage critical aquifer recharge. These features include bioretention and conservation areas and swales.

The vote of the Planning Commission on the above described recommendation is as follows:

<u>Name</u>	<u>Aye</u>	<u>Nay</u>	<u>Abstain</u>
Karin Agosta	X		
Lovel Pratt	X		
Bob Gambel	X		
Brian Ehrmantraut	X		
Mike Kail	X		

RECOMMENDED this 19th day of May, 2008 which constitutes the date of the Planning Commission's action, per State law.

SAN JUAN COUNTY PLANNING COMMISSION



Chair or Vice-Chair

7/18/08

Date

Co-signor



Date

7/18/08

Attachments:

- A. 6 year Capital Improvement Plan for Eastsound Stormwater Projects (dated April 15, 2008)
- B. 20 year Capital Improvement Plan for Eastsound Stormwater Projects (dated April 15, 2008)
- C. Long Range Drainage Plan for Eastsound Village Urban Growth Area (Rasmussen Plan, May 2005)

July 29, 2008
Long Range Drainage Pla



SAN JUAN COUNTY COUNCIL

SIGN UP SHEET – Please Print Clearly

#	NAME	EMAIL ADDRESS	PHONE NUMBER
1	Mindy Kayl	mindykayl	376-510
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3	Greene Ranks		376-6042
4	Patty Miller	pattymiller@centurytel.net	376-6840
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**San Juan County
Community Development & Planning**

135 Rhone Street P.O. Box 947 Friday Harbor, WA 98250
(360) 378-2354 (360) 378-2116 Fax (360) 378-3922
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DATE: July 9, 2008

Staff Report

TO: SAN JUAN COUNTY COUNCIL

THRU; PETE ROSE, COUNTY ADMINISTRATOR

FROM: COLIN MAYCOCK, SENIOR PLANNER

MEETING DATE: JULY 29, 2008

SUBJECT: AMENDING THE SAN JUAN COMPREHENSIVE PLAN TO INCLUDE A NEW APPENDIX 10 TITLED "LONG RANGE DRAINAGE PLAN FOR EASTSOUND VILLAGE URBAN GROWTH AREA WITH UPDATED 6 AND 20 YEAR CAPITAL IMPROVEMENT PLANS.

ISSUE:

To approve of an amendment to the County Comprehensive Plan to include a new Appendix 10, titled "Long Range Drainage Plan for Eastsound Village Urban Growth Area" and its associated updated 6 and 20 Year Capital Improvement Plans.

EXECUTIVE SUMMARY:

The Western Washington Growth Management Hearings Board (GMHB) Final Decision and Order (FDO), Case No. 05-2-022c, June 20th, 2006 regarding the Eastsound Urban Growth Area (UGA) found that in order to be considered compliant, the county would need, in part, to;

1. To include in the Capital Facilities element of its Comprehensive Plan, a six year financing plan for its stormwater drainage plan for the Eastsound UGA.
2. To include in the Capital Facilities element of its Comprehensive Plan, demonstrable proof that urban levels of service are planned for the entire UGA over the 20 year planning period.
3. To include in the Capital Facilities element of its Comprehensive Plan, a clear statement of expected problems, potential projects that would

address these problems and a projection of expected facility requirements as well as the means by which such improvements would be funded.

BACKGROUND:

The Eastsound UGA was first adopted by San Juan County in October 2000. It covered approximately 1,263 acres and was entirely within the 1,767 acre Eastsound Planning Area. Following the initial appeal, the Eastsound UGA was revised and the 2005 Eastsound UGA, covering approximately 786 acres, was adopted by Ordinance 13-2005.

The compact Eastsound UGA was appealed to the GMHB and on June 20, 2006 an FDO was published that detailed the reasons why the current UGA boundary was not compliant with the Growth Management Act (GMA).

Among the findings of fact, the GMHB held that the current Capital Facilities element in the San Juan Comprehensive plan lacked sufficient detail to show that there were plans and provisions in place to show that urban levels of service were planned for the planning horizon. Additionally the GMHB noted that the San Juan County Comprehensive Plan's Capital Facilities element lacked a compliant 6 year capital improvement plan that would not only delineate specific projects and expected costs within the stormwater management plan, but also detail the timeframe for the initiation and completion of those projects. The GMHB held that the absence of these elements meant that the County failed to meet the minimum standards set by RCW 36.70A.070 (3) (d).

RCW 36.70A.070 (3) states;

A capital facilities plan element consisting of: (a) An inventory of existing capital facilities owned by public entities, showing the locations and capacities for the capital facilities; (b) a forecast of the future needs for such capital facilities; (c) the proposed locations and capacities of expanded or new capital facilities; (d) at least a six-year plan that will finance such capital facilities within the projected funding capacities and clearly identifies sources of public money for such purposes; and (e) a requirement to reassess the land use element if probable funding falls short of meeting existing needs and to ensure that the land use element, capital facilities plan element, and financing plan within the capital facilities plan are coordinated and consistent. Park and recreation facilities shall be included in the capital facilities element.

In the discussion of the capital facilities element, as it relates to the Eastsound UGA, the Board noted that the absence of an adopted plan showing the elements listed above, particularly the six-year capital improvement plan illustrating the sources of funding, was 'clearly erroneous.'

Prior to the adoption of the 2005 Eastsound UGA, the County hired a consultant to analyze the stormwater issues facing Eastsound, inventory existing facilities, forecast future facility needs, identify specific projects to ameliorate those issues

and the project the expected costs of those projects. The Long Range Drainage Plan for Eastsound Village Urban Growth Area, written by Gerald P. Rasmussen, P.E., was completed in May, 2005 and the draft version of it was submitted to the GMHB as part of the 2005 compliance submission. The Long Range Drainage Plan for Eastsound Village Urban Growth Area contains the all of the required elements, premised on the contemporary build out scenarios for a larger UGA, (inventory, forecast of future needs as well as the proposed locations and capacities for expanded or new capital facilities). Crucially, however, the plan did not include six and twenty year capital improvement plans that showed those projects' sources of financing. The plan actually forecasts costs and projects from 2005 to 2044, however, these capital improvement plans do not show any funding sources and so fail to meet the requirements of RCW 36.70A.070 (3) (d).

The June 20th, 2006 FDO noted that;

As to the storm drainage plan, our examination shows that the plan contains a thorough analysis of the Eastsound UGA drainage problems and a good discussion of projects needed to address these problems. Even so, it does not contain a financing plan that identifies sources of funding for needed improvements... To assist with financing it [sic] storm drainage needs, the County has taken the difficult, but critical step of adopting a storm drainage utility. Ordinance 14-2005 shows that a mechanism to finance storm drainage projects has been established... However, the drainage plan does not show the extent that the storm drainage utility will support local projects and whether other sources of funding will be needed as required by RCW 36.70A.070 (d). Also because the storm drainage plan does not show how facilities will be provided in the 20 year planning period, it is clearly erroneous and does not comply with RCW 36.70A.020(12)¹ and RCW 36.70A.110 (3)² Emphasis in original (page 10-11).

The Board further noted that;

...the County has not adopted either the sewer plan or the drainage plan of ESSWD. The Board can find no evidence in the record showing that either of these plans have been adopted. Unless these plans are adopted (as a whole or in relevant part) and a County commitment made to pursuing them, they provide no actual planning support for the Eastsound UGA. Emphasis in Original, (page 11).

In this passage, it can be seen that despite the inclusion of the drainage plan in the compliance submission, the Board viewed it (and would continue to do so until

¹ GMA Planning Goals, Public facilities and services. Ensure that those public facilities and services necessary to support development shall be adequate to serve development at the time the development is available for occupancy and use without decreasing current service levels below locally established minimum standards.

² Comprehensive Plans—Urban growth areas. Urban growth should be located first in areas already characterized by urban growth that have adequate existing public facility and service capacities to serve such development, second in areas already characterized by urban growth that will be served adequately by a combination of both existing public facilities and services and any additional needed public facilities and services that are provided by either public or private sources, and third in the remaining portions of the urban growth areas.

officially adopted as county policy), as irrelevant to the central question as to whether or not plans were in place to provide urban level services throughout the UGA over the 20 year planning period.

In addition to the Long Range Drainage Plan for Eastsound Village Urban Growth Area, in order to gain compliance, the County must also adopt the Eastsound Sewer and Water District's 2008 Update of 2003-2023 General Sewer Plan by reference into the Comprehensive Plan so that the County can show that there are plans in place to meet the capital facility needs of the UGA over the planning horizon.

ANALYSIS:

It is clear that in order to gain compliance for the Eastsound UGA, the capital facilities issues delineated by the GMHB must be addressed. The most direct method of tackling those issues is to adopt a new Appendix 10 to the San Juan County Comprehensive Plan along with the associated updated 6 and 20 year capital improvement plans. The Long Range Drainage Plan has already been reviewed by the GMHB and, had it been adopted in 2005 by the County Commissioners, along with 6 and 20 year capital improvement plans that identified sources of funding for the projects listed in the 6 year plan, it appears the GMHB is likely to have found it to be compliant.

The Long Range Drainage Plan for Eastsound Village Urban Growth Area is 3 years old.

The updated 6 and 20 year capital improvement plan prepared by Public Works on April 15, 2008 details the projected costs of the projects identified in the Long Range Drainage Plan for Eastsound Village UGA, the ordinance that actually details the source of the financing was considered and approved by the County Council on May 20th, 2008.

Upon review, the Planning Commission recommended a slight amendment to the plan's wording so that the first sentence in the fifth bullet point on page 10 reads "Introduce new concepts, technologies, and objectives for stormwater management such as multifunctional landscape features that mimic or replicate hydrologic functions and maintain the ecological and biological integrity of receiving streams AND ENCOURAGE CRITICAL AQUIFER RECHARGE³."

FINDINGS:

- A. The Long Range Drainage Plan for Eastsound UGA contains an inventory and analysis of existing public facilities and services.
- B. The Long Range Drainage Plan for Eastsound UGA contains a forecast of future needs as well as the proposed locations and capacities for expanded or new capital facilities and problem specific projects.

³ The "Long Range Drainage Plan for Eastsound" now includes this amendment.

- C. The updated 6 year capital improvement plan details both costs and projects that are expected to be constructed within the next 6 years.
- D. The updated 20 year capital improvement plan details costs and projects that are expected to be constructed over the planning horizon.

EXHIBITS:

- A. Long Range Drainage Plan for Eastsound Village Urban Growth Area (Rasmussen Plan, May 2005)
- B. 6 year Capital Improvement Plan for Eastsound Stormwater Projects (dated April 15, 2008)
- C. 20 year Capital Improvement Plan for Eastsound Stormwater Projects (dated April 15, 2008)

RECOMMENDATIONS:

I Move to adopt a new Appendix 10 to the San Juan County Comprehensive Plan titled "Long Range Drainage Plan for Eastsound Village Urban Growth Area" and associated updated 6 and 20 year Capital Improvement Plans.

